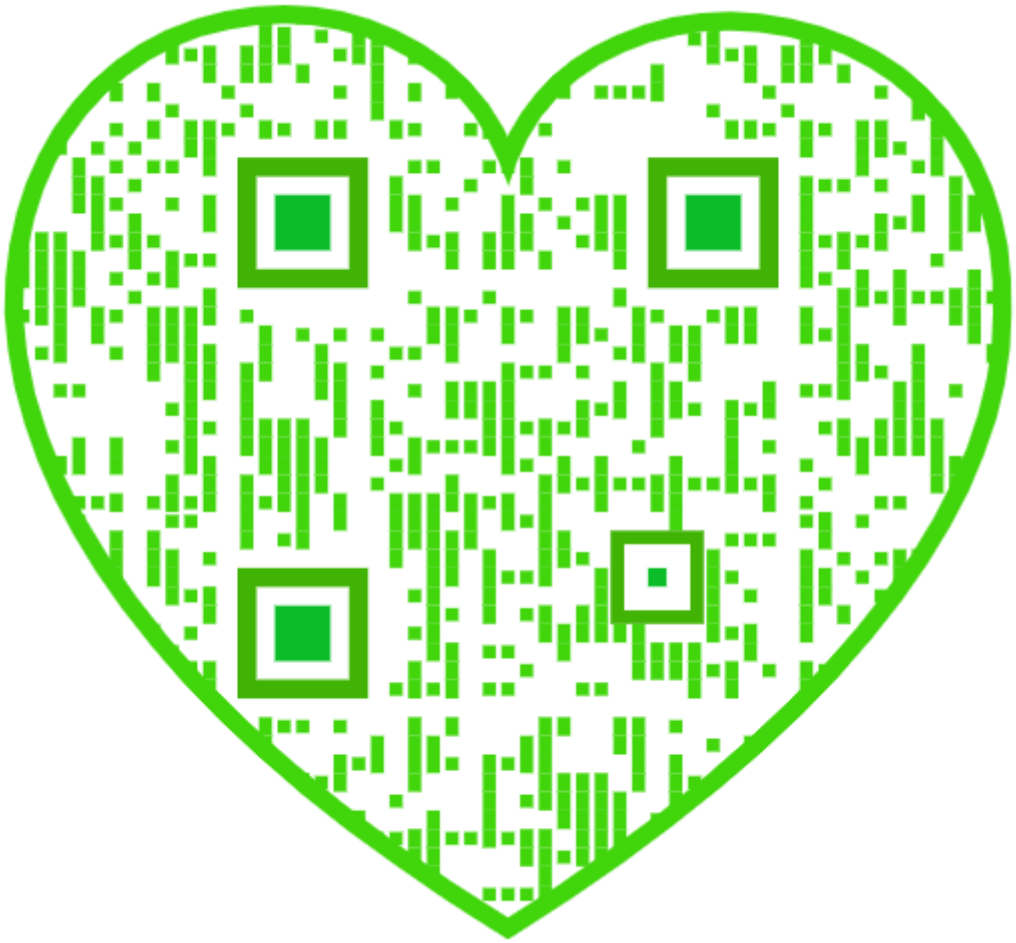

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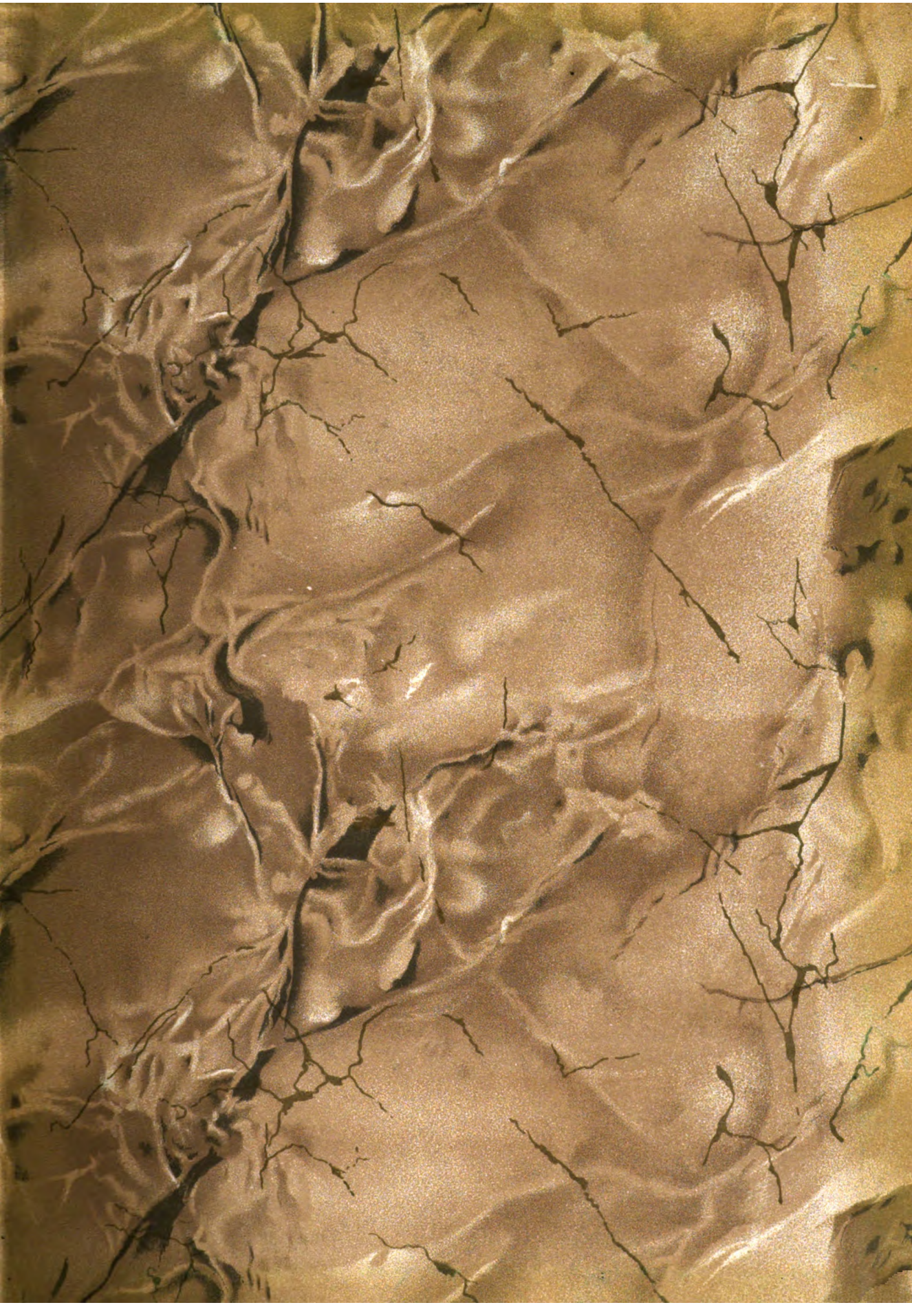

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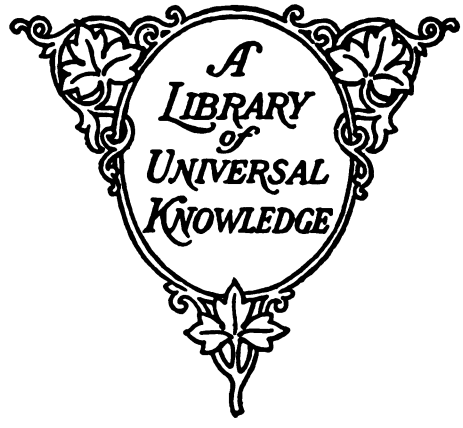

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KEY TO PRONUNCIATION.

ā	far, father
ā	fate, hate
a or ă	at, fat
ā	air, care
ạ	ado, sofa
â	all, fall
ch	choose, church
ē	eel, we
e or ĕ	bed, end
ė	her, over: also Fr. *e*, as in *de; eu*, as in *neuf;* and *oeu*, as in *boeuf, coeur;* Ger. *ö* (or *oe*), as in *ökonomie.*
ẹ	befall, elope
ē	agent, trident
ff	off, trough
g	gas, get
gw	anguish, guava
h	hat, hot
h or H	Ger. *ch*, as in *nicht, wacht*
hw	what
ī	file, ice
i or ĭ	him, it
ị	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din
j	gem, genius
kw	quaint, quite
ṅ	Fr. nasal *m* or *n*, as in *embonpoint, Jean, temps*
ñ	Span. *ñ*, as in *cañon* (căn'yŏn), *piñon* (pēn'yŏn)
ng	mingle, singing
nk	bank, ink
ō	no, open
o or ŏ	not, on
ô	corn, nor
ȯ	atom, symbol
ọ	book, look
oi	oil, soil; also Ger. *eu*, as in *beutel*
ö or oo	fool, rule
ou or ow	allow, bowsprit
s	satisfy, sauce
sh	show, sure
th	thick, thin
ṫh	father, thither
ū	mute, use
u or ŭ	but, us
ú	pull, put
ü	between u and e, as in Fr. *sur*, Ger. *Müller*
v	of, very
y	(consonantal) yes, young
z	pleasant, rose
zh	azure, pleasure
′(prime), ″(secondary)	accents, to indicate syllabic stress

THE ENCYCLOPEDIA AMERICANA

I

INDIA, also called **HINDUSTAN** or **INDOSTAN,** derived from the Persian form of the Sanskrit *sindhu,* a river, and signifying "the land beyond the Indus," is a name used both in ancient and modern times with great latitude of signification. The mainland of India proper is bounded north by the main range of the Himalaya Mountains; east by mountain ranges which divide it from Burma; southeast by the Bay of Bengal; south by the Gulf of Manaar, which separates it from Ceylon; west by the mountain chains enclosing the valley of the Indus, which separates it from Afghanistan and Baluchistan, and by the Indian Ocean. Its length north to south is nearly 2,000 miles; its greatest breadth east to west about 1,800 miles. It extends between lat. 8° 5′ and 35° 15′ N., and long. 65° 45′ and 97° E.

Political Divisions.— Legally "British India" means all territory governed by the "King-Emperor" or "Kaisar-i-Hind," as the monarch of Great Britain is designated in Hindustan, together with any territories of native princes or rulers under the suzerainty of the king of England exercised through the governor-general and viceroy of India.

In 1912 administrative changes resulted in the division of British India into 15 provinces as follows:

BRITISH PROVINCES	Area in square miles (1911)	Population in 1911
Ajmer-Merwara	2,711	501,395
Andamans and Nicobars	3,143	26,495
Assam	53,015	6,713,653
Baluchistan	54,228	414,412
Bengal	78,699	45,483,077
Bihar and Orissa	83,181	34,490,184
Bihar	42,361	23,752,969
Orissa	13,743	5,131,753
Chota Hagpur	27,077	5,605,362
Bombay (Presidency)	123,059	19,672,642
Bombay	75,993	16,113,042
Sind	46,986	3,513,435
Aden	80	46,165
Burma	230,839	12,115,217
Central Provinces and Berar	99,823	13,916,308
Central Provinces	82,057	10,859,146
Berar	17,766	3,057,162
Coorg	1,582	174,976
Madras	142,330	41,405,404
North-West Frontier Province*	13,418	2,196,933
Punjab	99,779	19,974,956
United Provinces	107,267	47,182,044
Agra	83,109	34,624,040
Oudh	24,158	12,558,004
Total provinces	1,093,074	244,267,542

* Districts and Administered Territories.

Delhi, 557 square miles, Pop. 390,000, a small enclave in the Punjab, was constituted a province and a separate territory under a chief commissioner 1 Oct. 1912, and became the capital of the empire and the seat of government, removed there from Calcutta.

The *Native States* with numerous tribal subdivisions, ruled by native princes who are feudatory to British authority and responsible to the viceroy of India for their good government, are as follows:

STATE OR AGENCY	Area in square miles	Population, 1911
Assam State (Manipur)	8,456	346,222
Baluchistan States	80,410	420,291
Baroda State	8,182	2,032,798
Bengal States	5,393	822,565
Bihar and Orissa States	28,648	3,945,209
Bombay States	63,864	7,411,675
Central India Agency	77,367	9,356,980
Central Provinces States	31,174	2,117,002
Hyderabad State	82,698	13,374,676
Kashmir State	84,432	3,158,126
Madras States	10,549	4,811,841
Cochin	1,361	918,110
Travancore	7,594	3,428,975
Mysore State	29,475	5,806,193
N. W. Frontier Province (agencies and Tribal areas)	25,472	1,622,094
Punjab States	36,551	4,212,794
Rajputana	128,987	10,530,432
Sikkim State	2,818	87,920
United Provinces States	5,079	832,036
Total Native States	709,555	70,888,854
Total India	1,802,629	315,156,396

Physical Features.— The natural boundaries of the peninsula of India, which forms a triangle washed on two sides by the sea and having its base in the great mountain chain which separates it from Tibet on the north, are completed by its three great rivers, the Indus, the Ganges and the Brahmaputra. These all rise in the Tibetan Mountains beyond the Himalayas, and the first flowing west, the two latter east, descend in a southern direction toward the sea; the Indus discharging itself into the Indian Ocean; the Ganges and the Brahmaputra, after watering in their separate course a large part of northern India, uniting to pour their waters together by numerous mouths into the Bay of Bengal. The mountains enclosing the basins of these rivers form the east and west boundaries of the northern part of the peninsula. The Himalayas, the loftiest mountain range in the world, with heights of upward of five miles above the level of the sea, descend by successive slopes to the elevated plain of northern India. (See INDUS; GANGES; BRAHMAPUTRA; HIMALAYA). The entire peninsula is sometimes distinguished by three natural divi-

sions. The Vindhya Mountains, a range of about 3,000 feet in height, which extends irregularly across the peninsula from Gujarat to the basin of the Ganges, forms an anciently-recognized division into two parts under the names of Hindustan and the Deccan (Southern Land). The name Hindustan, given in this restricted sense to the northern part of the peninsula, is frequently applied to the whole. The ancient division of the Deccan is again subdivided into two, the name Deccan being restricted to the northern part, the southern from the river Krishna or Kistnah, which flows from west to east almost across the whole peninsula, being called southern India or India south of the Krishna. The portion of India watered by the Ganges and its tributaries is by far the most fertile and populous of the whole. At no great distance from the opposite extremities of the Vindhya Mountains two great ranges proceed southward along the line of the coast. The Western Ghâts, which attain a height of 5,000 to 6,000 feet, though at some parts much lower, proceed along the west coast to Cape Comorin, the southernmost point of India. They do not generally recede more than 40 miles from the sea, and rarely more than 70. On the sea side their descent is generally precipitous, forming a regular sea-wall. On the land side they descend gradually, and sometimes almost imperceptibly, to the elevated plains of the interior. The Eastern Ghâts recede farther from the east coast, are less elevated and precipitous. Before reaching as far in their southern course as Madras, they trend inward and unite with the transverse range of the Nilgiri Hills, which connects them with the Western Ghâts. This mountain-formed triangle encloses an elevated table-land with a gradual slope eastward from the Western Ghâts, and which is continued beyond the Eastern Ghâts to the sea. The elevation of the plain of southern India also increases toward the south. In the Deccan it is about 3,000 feet above the level of the sea. In the neighborhood of the Nilgiri Hills, which rise 3,000 feet above it, it reaches 7,000 feet.

Hydrography.— The chief rivers of India besides the Indus, Ganges and Brahmaputra, already named, are the Jamna, Ramganga, Gumti, Gogra, Gandak, Kusi, etc., tributaries of the Ganges; the five rivers of the Punjab, Satlej, Bias, Ravi, Chenab and Jhilam, tributaries of the Indus; the Nerbudda, enclosed on its northern bank by the Vindhya Mountains and the Tapti, which flow west into the Gulf of Cambay, the Mahánadi, the Godávari, the Kistna, North and South Pennar, Vellar, Kaveri, etc., all flowing eastward into the Bay of Bengal. The uniform direction of the great rivers south of the Tapti is explained by the inclination of the land already described. The coasts of India have very few indentations and consequently very few good natural harbors. The western coast is known by the name of the Malabar, the eastern by that of the Coromandel coast. There are no lakes of any extent in India — Chilka and Kolair near the east coast being the largest.

Geology.—All the great mountain ranges are chiefly composed of granite and of granitic rocks, which form also the base of the plateau of the Deccan. Both in the peninsula and in the Himalayas gneiss predominates, associated with micaschist, hornblende-schist, chlorite slate and primitive limestone. Syenite prevails in the southeast of the peninsula. In the southern portion of the Western Ghâts the granitic rocks are overlaid by an iron clay, which is continuous to the end of the peninsula, and reappears in the island of Ceylon. In the upper portion of the Western Ghâts and adjoining ramifications of the Vindhya Range, basaltic trap in various forms overlies the granite to an extent unparalleled elsewhere in the world. It entirely covers a large portion of the table-land of the Deccan. In this district, trap and granite frequently pierce the surface in isolated masses, forming flat-topped hills nearly perpendicular, and which can only be ascended by steps, or winding, dangerous paths. These have been converted into strongholds from a remote antiquity. They are frequently crowned with forts and form a peculiar feature of the landscape. On the lower sides of the Himalayas regular strata of the Secondary and Tertiary periods are largely developed. Many of the sandstones and shales of the Secondary period belong to the coal-measures. The Indian Tertiary formations attain their greatest breadth toward Sind and the Punjab, where fossil remains, including many of singular forms and gigantic dimensions, are abundant.

Mineral Resources.— The principal coal fields in India are found in the region bounded north by the Ganges, south by the Godávari, and stretching east and west from the neighborhood of Calcutta to the middle of the valley of the Narbada. Indian coal is distinguished by its excessive lamination. The annual production in India was 16,500,000 tons in 1913, from 427 collieries worked throughout Bengal, Hyderabad, Assam, Rewah, the Central Provinces, Punjab, Baluchistan and Burma. The most important mines are those of the East Indian Railway Company near Giridhi (Bengal) and the Singareni mine in Hyderabad. Of the coal used on the railways 95 per cent is Indian coal. Iron ore is abundant in many parts of India, but the amount produced is still small. The only large iron-works in India are at Sanchi and Barrakur in Bengal, but iron is manufactured locally on a small scale in other parts of Bengal and in the central provinces. The chief obstacle to the successful development of the iron industry of India is the difficulty of finding the ore, fuel and flux sufficiently near to one another to make it profitable, but it is believed that iron-works near Calcutta, using Madras ore and Bengal coal, would succeed. The Tater Ironworks at Sanchi, lately started, is the largest in Asia. Gold is worked to some extent, more especially in Mysore, the total production in 1914 being 607,388 ounces. Copper, lead, antimony and other metals are fairly abundant. Burma yields a large amount of petroleum annually, and smaller quantities are obtained from Assam and the Punjab. The total output for 1913 was over 277,555,255 gallons, but much is still imported. There are valuable ruby mines in Upper Burma, and a few diamonds are still obtained in Central India. Salt is an important manufacture and source of revenue; its production is treated under the head of *Finance*.

Soils.— The alluvial deposits along the mountain valleys and in the plains, and the soil composed of disintegrated rock masses on the plateaus, are especially rich and of great productivity. Their fertility is greatly enhanced

INDIA
SCALES
175 Statute Miles = 1 Inch.
0 50 100 200 300
282 Kilometers = 1 Inch.
0 50 100 200 300 400 500
Rand McNally & Co.'s New 11 x 14 Map of India.
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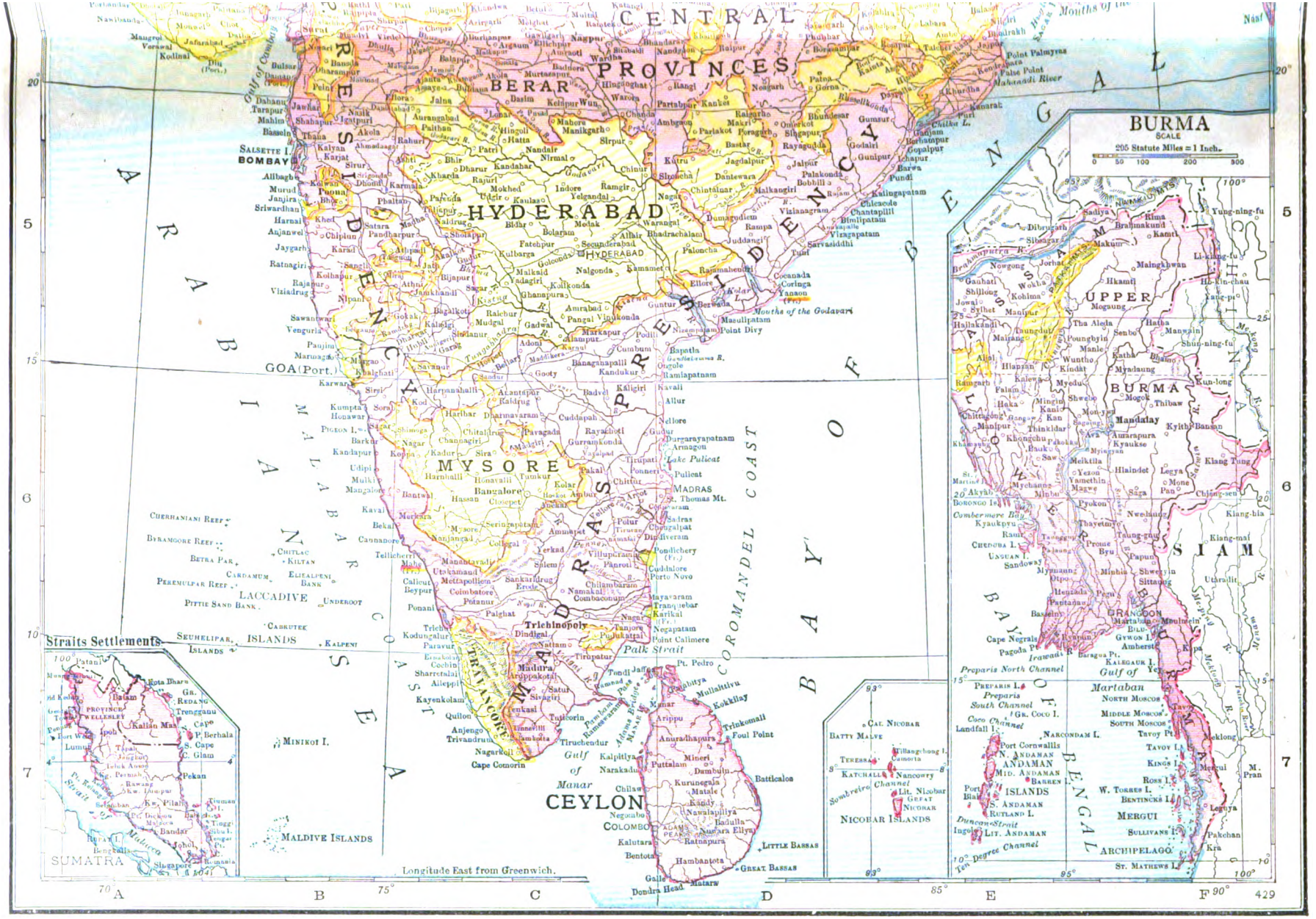
British Possessions.
Independent States and Colonies.
Feudatory States.
AFGHANISTAN
BALUCHISTAN
HINDUSTAN
KASHMIR
NORTH WEST FRONTIER PROVINCE
PUNJAB
RAJPUTANA
GREAT INDIAN DESERT
BOMBAY
GUJARAT
CUTCH
CENTRAL INDIA
OUDH
NORTH WESTERN PROVINCES
DELHI
NEPAL
TIBET
BHUTAN
SIKKIM
EASTERN BENGAL AND ASSAM
BENGAL
Howrah
Calcutta
Mouths of the Ganges
Mouths of the Indus
Gulf of Cutch
Ran of Cutch
Karachi
Quetta
Lahore
Amritsar
Delhi
Lucknow
Cawnpore
Allahabad
Benares
Darjeeling
Katmandu
Punakha
Lhasa
Simla
Srinagar
Jeypore
Jodhpur
Udaipur
Ajmere
Bombay
Baroda
Ahmedabad
Indore
Gwalior
Agra
Patna
Gaya
Ranchi
Calcutta
Cape Monze
Haibak
Sadmardia
Banu
Kabul
Ghazni
Mukur
Urgun
Gulistan
Zarmelan
Utak
Saleh Karez
Chaman
Sharan
Musakhel
Pishin
Mango
Harnai
Loralai
Shahgolai
Nurpur
Dera Ghazi Khan
Kirta
Sibi
Bagh
Kachi
Dajal
Ramgarh
Bahawalpur
Ucch
Mojarh
Shahpur
Jacobabad
Shikarpur
Larkhana
Khairpur
Ranipur
Rohri
Kishangarh
Shahgarh
Jaisalmer
Pokaran
Phalodi
Nagaur
Khatu
Sambhar
Jaipur
Ajmere
Beawar
Jodhpur
Balotra
Sojatala
Sindri
Marwar
Pali
Erinpura
Chitor
Udaipur
Dhanera
Palanpur
Deesa
Edar
Ahmadabad
Dholka
Cambay
Gulf of Cambay
Surat
Nasik
Poona
Satara
Sholapur
Hyderabad
Secunderabad
Haidarabad
Kolhapur
Belgaum
Goa
Mangalore
Cochin
Trivandrum
Madras
Pondicherry
Vizagapatam
Cuttack
Puri
Chilka Lake
Ganjam
Berhampur
Midnapur
Hooghly
Howrah
Burdwan
Bankura
Asansol
Dhanbad
Hazaribagh
Ranchi
Purulia
Jamshedpur
Chaibasa
Sambalpur
Raipur
Bilaspur
Jubbulpore
Nagpur
Chanda
Wardha
Amraoti
Akola
Khandwa
Hoshangabad
Betul
Chhindwara
Seoni
Mandla
Jabalpur
Katni
Rewa
Allahabad
Fatehpur
Cawnpore
Lucknow
Unao
Rae Bareli
Sultanpur
Partabgarh
Faizabad
Akbarpur
Azamgarh
Jaunpur
Ghazipur
Benares
Mirzapur
Allahabad
Banda
Hamirpur
Jhansi
Gwalior
Morar
Sipri
Narwar
Datia
Orchha
Khajuraho
Chhatarpur
Panna
Rewa
Maihar
Nagode
Satna
Rewah
Sohagpur
Shahdol
Umaria
Pendra
Korea
Chirimiri
Jashpurnagar
Ranchi
Purulia
Manbhum
Dhanbad
Asansol
Burdwan
Bankura
Midnapur
Hooghly
Howrah
Calcutta
Diamond Harbour
Port Canning
Tamluk
Kanthi
Contai
Balasore
Cuttack
Puri
Chilka Lake
Ganjam
Berhampur
Vizagapatam
Rajahmundry
Cocanada
Masulipatam
Ellore
Guntur
Ongole
Nellore
Madras
Pondicherry
Cuddalore
Salem
Coimbatore
Erode
Karur
Trichinopoly
Madura
Dindigul
Palni
Periyakulam
Tinnevelly
Palamcottah
Tuticorin
Cape Comorin
Trivandrum
Quilon
Alleppey
Cochin
Calicut
Cannanore
Mangalore
Goa
Belgaum
Kolhapur
Sholapur
Poona
Satara
Nasik
Surat
Cambay
Gulf of Cambay
Ahmedabad
Dholka
Viramgam
Mehsana
Kalol
Baroda
Chhota Udaipur
Dhar
Mhow
Indore
Ujjain
Mandsaur
Neemuch
Pratapgarh
Chitor
Bhilwara
Ajmere
Beawar
Merta
Nagaur
Jodhpur
Pali
Sojatala
Sirohi
Abu
Palanpur
Deesa
Radhanpur
Wao
Nagar Parkar
Umarkot
Mirpur Khas
Hyderabad
Tatta
Karachi
Kotri
Jerruck
Sehwan
Dadu
Jacobabad
Shikarpur
Sukkur
Rohri
Khairpur
Ranipur
Kot Diji
Mirpur
Khipra
Gurrira
Chotan
Barmer
Sheo
Kotra



CENTRAL PROVINCES
BERAR
HYDERABAD
MYSORE
MADRAS
PRESIDENCY
PRESIDENCY
CEYLON
BURMA
SCALE
295 Statute Miles = 1 Inch.
0 50 100 200 300
ARABIAN SEA
BAY OF BENGAL
MALABAR COAST
COROMANDEL COAST
Gulf of Manar
Palk Strait
Gulf of Martaban
Straits Settlements
SUMATRA
LACCADIVE ISLANDS
MINIKOI I.
MALDIVE ISLANDS
NICOBAR ISLANDS
ANDAMAN ISLANDS
MERGUI ARCHIPELAGO
Longitude East from Greenwich.
A B C D E F
429

and maintained by an elaborate system of irrigation. See paragraph in this article on *Canals and Irrigation.*

Climate. – India extends 15½ degrees within north tropical latitudes, and 12½° within the temperate zone. Owing to modifying circumstances, the climates contained within this range are not only extremely various, but distributed with great irregularity. One of the chief modifying circumstances is the distribution of moisture, the great regulators of which are the monsoons. The northeast monsoon blows from October to March, the southwest from April to September. The latter surcharged with vapor from the Indian Ocean condenses in torrents on the heights of the western Ghâts, and forms the rivers which flow to the east. Before it reaches the Coromandel coast in the southeast it becomes a dry wind which scorches up vegetation. In the west, on the contrary, this wind passes over the low plains in the lower valley of the Indus, is arrested by the Himalayas, and fills the tributaries of the Ganges. The northeast monsoon runs a similar course in the opposite direction, but deriving less moisture from the Bay of Bengal, which is of less extent than the Indian Ocean, it has less influence on the climate, and its season is in general the dry one. The great plain of Southern India being exposed to greater heat than that of Northern India, and not being watered by the snow-fed streams of the Himalayas, is naturally much less fertile. The seasons in India are divided into rainy, cool and hot. The periods of these different seasons vary according to latitude and modifying circumstances. On the Malabar coast the rain begins earliest to the south. At Calcutta rain falls from June to October; the cool season begins about November, the hot season in February, the heat increasing gradually till May. In Calcutta where the mean annual temperature is about 79°, the range is from 50° to 85° F. In Bombay the mean annual temperature is about 82°, the range about 10°; in Madras mean about 84°, range 7° to 8°. The annual rainfall in India is much greater than that of England; but it is distributed with great irregularity. The basin of the Indus, including all Sind and the half of the Punjab, is an arid region with an annual rainfall under 15 inches. The high plateau in the interior of South India has an annual rainfall generally under 30 inches. On the whole Malabar coast the rainfall is over 75 inches; at Kananor it reaches 128 inches. On the Coromandel coast it is very much lower, being 45 inches at Vizagapatam, 50 inches at Madras, while farther south it falls below 30 inches. Between the arid region of the Indus and the Ganges runs a dry zone of 100 to 200 miles wide, including Lahore, Delhi and Agra, with a rainfall between 15 and 30 inches. The valleys of the Tapti, the Nerbudda, the lower part of the Jamna, the Ganges and the Brahmaputra, are generally over 30. Along the slopes of the Himalayas from Cashmere east to the boundaries of India, and southeast to the mouths of the Mahánadi runs a belt of country with a rainfall over 60 inches, within which is included the lower course of the Ganges. Within this is another belt, including a lower slope of the Himalayas, and the lower course of the Brahmaputra before its junction with the Ganges, in which the rainfall rises above 75 inches.

Forests.— The three most valuable timber trees of India are the teak (*Tectona grandis*), the sál or saul (*Shorea robusta*), and the deodar (*Cedrus Deodara*). The teak grows most luxuriantly along the Bombay coast, in Travancore and Cochin and in Burma, but it is also abundant throughout much of Central India and elsewhere. The sál is the chief forest tree of the Himalayan slopes, from the Satlej eastward to Assam, and it grows also in the forests of Central India and the Eastern Ghâts. The home of the deodar is the northwestern Himalayas. Among the most valuable trees of the densely forested Western Ghâts from Kanara to Travancore and Mysore are teak, blackwood, bamboos, sandal-wood, a kind of ebony and *Calophyllum inophyllum*, whose wood is prized for the spars of ships. In the United Provinces and neighboring districts the leading species are sál and several varieties of pines, and in the extensive jungles of the Ganges delta the most useful wood is that of the sundari (*Heretiera littoralis*). The forests of Assam yield sál, *Pinus Kasya*, caoutchouc (*Ficus elastica*), and other useful species and plantations of teak, tun or toon (*Cedrela toona*), and sissoo (*Dalbergia sissoo*) have been laid out. Besides teak the Burmese forests contain ironwood and the cutch-tree (catechu). Before the formation of the Indian Forest Department the forests were recklessly destroyed by timber-cutters, nomadic cultivators and others, but large forest areas in all the provinces have now been marked off as reserved forests under the immediate care of the forest officers, and other forest areas have been brought under partial conservancy. Timber-cutting and grazing have been either prohibited or restricted; and plantations of the more useful trees have been formed in many parts of the country. In every province a few of the most valuable timber trees are declared to be reserved trees, and can only be felled under special license. Forest revenue is raised by royalities on, or by the sale of, timber or other produce, and by the issue at specified fees of permits to graze cattle, or to extract for sale timber, firewood, charcoal, bamboos, canes, and other minor forest produce. The reserved forests now cover an area of more than 96,867 square miles, and the protected or partially conserved forests occupy other 142,000 square miles. Some of the native states, such as Mysore, Travancore, Baroda and Kashmir, have followed the example of the British government.

Flora.— Where moisture is plentiful, as in the valley of the Ganges, vegetation is superabundant. The delta of the Ganges, in particular, called the Sunderbunds, is covered with dense jungle full of the largest wild animals, and the excessive vegetation renders most of the mouths unnavigable. There are many other similar tracts of extensive forest and jungle. On the Coromandel coast, where the heat which reaches 100° F., vegetation is not luxurious, and the delta of the Indus from the southeast of the Punjab to the Ran, or great salt marsh of Kach (Cutch), forms a great sandy desert, continuous across the river with the desert of Baluchistan, and with a wide band stretching across the whole continent of Asia to Central Africa. In the various altitudes of the Himalayas forms of vegetable and animal life belonging to all the various climates from tropical to polar are to be found. These as well as

the Western Ghâts are magnificently wooded. Orchids, rhododendrons and other valuable flowers are common. Among the staple natural products of India are rice, maize, wheat, barley, cotton, flax, hemp, jute, rhea, indigo, tea, coffee, sugar-cane, opium, tobacco, ginger, pepper cardamoms, palms bearing nuts which are extensively consumed, anise, dye-woods, etc. European fruits abound, and among indigenous fruits may be mentioned the mango, plantain, pomegranate, citron, date, almond, grape, guava, pineapple and tamarind. Palms, including the date, cocoanut, palmyra, betel-nut and other species, the banyan, and bamboo, are common features of the vegetation.

Fauna.— The elephant, the rhinoceros, the camel, the tiger, a few lions in the northwest, the leopard, bears, hyena, jackal, wolf and numerous smaller carnivora, the boar, antelopes, deer, wild ox, ass, sheep and goat, monkeys in great variety, and the greater number of European quadrupeds are found. There are several large species of ox, such as the gaur or "bison" and the arnee or wild buffalo. Crocodiles, snakes (including the dreaded cobra), and reptiles in all varieties are very numerous; of birds, the eagle, vulture, falcons, peacock, parrots, king-fishers, mina-bird, partridge, quail, heron, stork, are characteristic species, and other varieties, both indigenous and common to other regions, are numerous. Fish are plentiful and in great variety, both on the coasts and in the rivers.

Land Tenure and Revenue.— In India the state, or the monarch, has always enjoyed a share in the rent or profits from the land. Before the advent of the Mohammedans and the establishment of the Mogul Empire the almost universal unit for the purposes of revenue collection was the village community. In a village, community land was held, not by private owners, but by cultivators occupying it under the village corporation, and the land revenue was collected from the head-man as representing the community. With the Mohammedan conquest new methods of revenue collection were introduced. The state claimed one-sixth of the gross produce of the soil as its share, and entrusted its collection to persons who each agreed to pay a definite amount from the district assigned to him. These revenue farmers, known as *zamindars,* were often local magnates under the old Hindu system.

The term "settlement" is applied in Indian revenue affairs to the process of assessing the land revenue demand. Occasionally, in newly acquired or specially backward tracts, the land revenue is assessed for a short term of years on a general review of the circumstances and capabilities of the land and people concerned; such a process is called a summary settlement. But a regular settlement is a more complicated affair, and consists of many stages; the revision is arranged to take place once every thirty years. In the first place, every separate estate or holding is demarcated by permanent marks on the ground; and disputes between neighboring right-holders are investigated and decided. Every estate or holding is then surveyed and mapped, all boundary-marks, wells and buildings being shown on the field or cadastral maps. After the field maps are prepared, the next process is to classify or record each field according to its productive value, as evidenced by its soil, the amount of its produce, or by the rent paid by the farmer to the landlord. A record is at the same time drawn up of all rents paid, and of all rights, whether landlord rights, or tenant rights, or rights of user, over all the ground, buildings, wells and trees shown in the map. Then the assessing officer (or settlement officer, as he is often called) compiles the information obtained for all the lands in a circle of villages; and on a review of all these data, of the past fiscal history of the tract, of the range of prices, of the accessibility of markets, and of other general considerations, he proposes government rent rates or revenue rates for the several classes of lands in the circle. The rent rates or revenue rates proposed by the settlement officer, and the grounds on which they were based, are then investigated by a superior officer, and are not adopted until they have been accepted or modified by the latter. The rent averages in most cases at one-half the gross produce of the land.

In provinces where the zamindari tenure prevails, that is, where single proprietors or proprietary brotherhoods possess large estates of several hundreds or thousands of acres, the state revenue is assessed at an aliquot part (usually about one-half) of the ascertained or assumed rental. The revenue, though it is fixed with reference to acreage rates on the land actually cultivated, is assessed on, and is payable by, each estate as a whole; the assessment remains unchanged for the 30 years, or other period of the settlement; the proprietor can bring as much as he likes of his waste and fallow land under the plough; and it is only on reassessment at the end of the term of the settlement that the state obtains any increase of revenue on account of the extensions of cultivation during the settlement period. In provinces where the rayatwari tenure prevails, that is, where each petty proprietor holds directly from the state, generally cultivates his own land, and has no landlord between himself and the government, the revenue is separately assessed at an acreage rate on each petty holding, and land revenue becomes payable at once, or after a short term of grace in the case of uncleared lands, on all extensions of cultivation. The rayatwari proprietor is at liberty to throw up his holding, or any portion of it, at the beginning of any year, after reasonable notice; the zamindar, or large proprietor, engages to pay the revenue assessed upon him for the term of the settlement.

The land revenue assessment was fixed permanently more than 100 years ago on the greater part of Bengal, about a third of Madras, and certain southern tracts of the Northwest now the United Provinces, paying in all about $14,250,000 a year. In the temporarily settled tracts, comprising the rest of India, it is fixed periodically for terms of 12 to 30 years. In the nine chief provinces (Bengal, Bombay and Sind, Madras, the United Provinces of Agra and Ouah, Central Provinces, Punjab, Burma, Assam, Berar) the number of rayatwari holders is about 273,000, of whom none belong to Bengal, Punjab, and the United Provinces and Oudh. The total number of zamindars and village communities is about 318,500, of which only Sind and Berar have none. The total number of holdings is thus about 591,500. In the greater part of Bengal

land is held by zamindars under a permanent settlement, but the tenants are protected by recent legislation. The rayatwari system is the prevalent one in Madras and in Bombay a similar system has been established. In the latter province the cultivators are now protected by law against the extortions of the money-lenders. The village community is still common in the United Provinces and the Punjab. In Oudh much of the land is held by talukdars, who have been granted certain privileges which are denied to the zamindars.

Agriculture.— The total area accounted for in the agricultural returns for 1913 was 748,868,885 acres, of which 80,851,369 are under forest, 146,386,852 not available for cultivation, and 163,784,575 culturable waste and current fallows. The net crop-yielding area is 224,165,602 acres, or, taking account of land cropped several times in a year, 300,000,000 acres. The three chief food-grains of India are rice, millet, and wheat. Rice is the staple food of about a third of the population, and was grown on 76,792,000 acres in 1915, but it is nevertheless essentially a local crop, which can be cultivated with profit only under exceptional circumstances. Of the total rice area 40 million acres belong to Bengal, where it is the staple crop, and about seven million each to Madras and Burma. Over 90 per cent of the cultivated area of Lower Burma is under rice, and it is grown on nearly three quarters of the area of Assam, about one-third of that of the Central Provinces, a quarter of that of Oudh, while it is of importance also in the United Provinces and Sind. It is grown to a less extent in the Punjab and Bombay. Rice is also cultivated by hill tribes in all parts of India. In Bengal there are two chief rice harvests in the year, the *áus* or early crop, chiefly for local consumption, and the *áman* or winter crop, chiefly for export; but in Lower Burma, whence most of the exported Indian rice comes, there is but one harvest, corresponding to the Bengal winter crop. The total area under wheat was in 1915, 30,143,000 acres, mainly in the Punjab, (7½ million), where it is the leading crop, the United Provinces of Agra and Oudh, the Central Provinces, Bombay, Central India and Bengal. The area under the various kinds of millet and maize, which constitute the food of poor people as well as cattle, is 43 million acres, chiefly in Bombay (13½ million), Madras, Punjab, United Provinces, Central Provinces, Sind, Oudh, Bengal and Upper Burma. The chief varieties of millet grown in India are *joár*, or *jawári*, or *cholam*, great millet (*Sorghum vulgare*); *bájra*, or *kambu*, spiked millet (*Pennisetum typhoideum*); and *ragí*, or *náchani* (*Eleusine corocana*), grown chiefly in Southern India. About 8,000,000 acres are sown with barley, chiefly in the upper Ganges valley, the Himalayan valleys, and the Punjab. Gram crops or pulses, especially chick-pea, green-gram, horse-gram, lentil and pigeon-pea, take up 10 million acres. The large native demand for oil has been reinforced in recent times by a rapidly-increasing foreign demand, and in consequence the cultivation of oil-seeds has greatly developed. They are grown in many parts as a second crop on ground from which rice or some other food crop has already been taken. The chief varieties cultivated are linseed, rape-seed, mustard-seed, sesamum (*til* or gingelly), ground nut and castor-oil, and the total area occupied by them is 16 million acres, chiefly in Bengal, Bombay and Sind, Madras, Central Provinces and Punjab. The area under ground-nuts in Bombay and Madras is about 1,663,000 acres. The cultivation of vegetables for household use is general, and near some of the towns it is carried on more extensively. Potatoes thrive best in the more elevated tracts. Among cultivated fruits are the mango, guava, orange, melon, citron, lime, fig, plantain, pineapple, pomegranate, tamarind, shaddock, jack, papaw and custard-apple. The area under sugar-cane is about 2,375,000 acres in Bengal (especially Orissa), United Provinces, Punjab, Oudh, Madras and Bombay. Jaggery sugar is made from the bastard date-palm which is grown for this purpose in the neighborhood of Calcutta and in northeastern Madras. The tea crop is one of great and increasing importance, and occupies about 636,000 acres, of which 400,000 are in Assam, the rest being in Bengal, Punjab, United Provinces, Madras, Burma and native states. With the exception of a few hundred acres in Burma, Assam, etc., the whole of the coffee-growing area, amounting to about 280,000 acres, is in Southern India, in Mysore, Koorg, Madras, Travancore and Cochin. The chief cinchona plantations are the government ones at Darjiling and in the Nilgiris. The tree was introduced by the Indian government.

Cotton is one of the most valuable vegetable productions of India. The total area under the cotton-plant, including the Native states, is 17,967,000 acres in 1915, distributed thus: Bombay and Sind (5,000,000), Berar (2,500,000), Hyderabad (1,700,000), Madras (1,400,000), United Provinces of Agra and Oudh (1,250,000), Punjab (1,750,000), Central Provinces (1,000,000), and smaller areas in Central India, Rajputana, Burma and Bengal. Next in importance to cotton among Indian fibres comes jute, which is cultivated in eastern Bengal along the valleys of the Ganges and the Brahmaputra, accounting for 2,377,000 acres. The cultivation of the mulberry, for the rearing of the silk-worm, is chiefly carried on in eastern and northern Bengal, with Murshidabad as a centre. The indigo industry is one of the oldest in India, but it is at present in a languishing condition. The area under the plant is about 314,000 acres. The opium poppy is cultivated in Behar and the United Provinces of Agra and Oudh, in the Punjab and in the native states of Rajputana and Central India, occupying in all about 200,000 acres. (See below under *Finance*). Tobacco is grown in every district for local consumption. Among the numerous minor cultivated vegetable products of India are turmeric, chillies, ginger, coriander, aniseed, black cummin, fenugreek, pepper, cardamoms, betel-pepper, areca or betel-nut palm, cocoanut palm, palmyra palm and date-palm. Experimental cultivation of rhea, rubber, sisal-hemp and other valuable economic plants has been carried out on the experimental farms maintained by government in various parts of the country.

Stockraising.— Horned cattle are used in agricultural operations throughout all India, except Sind and the Punjab, where camels generally take their place. The total number of cattle in India is over 120,000,000, of sheep and goats 40,000,000, of horses, ponies, mules and donkeys, 2,500,000, and of camels about 250,000. There are large numbers of buffaloes in all parts of the country. A public veterinary department

attends to the improvement of the breeds of horses, ponies, mules and cattle, the prevention of disease among domestic animals and the provision of veterinary instruction. Its operations are mainly confined to Northern India, where the conditions are most favorable for the breeding of horses for military purposes.

Commerce.— From a very early period down till comparatively recent times Western traders visited India in order to obtain the gold and silver, jewels, spices and other costly products for which India was then celebrated, but the present foreign trade of India has developed under British rule and rests on an entirely different basis. In the year 1700 the total value of the exports from India was under $5,000,000, in 1834 the value had risen to $50,000,000, and in 1913 goods and treasure to the value of about $800,000,000 are exported every year. In 1913–14 the total value of private imports by sea and government imports of stores, as well as treasure was $782,492,030. The total value of private exports of Indian merchandise, foreign merchandise re-exported, government and treasure was $853,630,255, the total sea-borne trade being $1,636,122,285. The chief articles of import were: cotton woven goods, metals and hardware, oils, chiefly petroleum, sugar, railway material, machinery and mill-work, cotton yarns, chemicals, medicines, dyes, woolen goods, silk, raw and manufactured, provisions, liquors and apparel. The chief exports were: jute, raw and woven, husked rice, hides and skins, oil-seeds, raw cotton, tea, opium, cotton yarns, wheat, indigo, coffee, raw wool and cotton woven goods. The proportion of trade directly with European countries is about 63½ per cent omitting the trade with Egypt much of which really goes to Europe. The trade with the United Kingdom is over 60 per cent of the trade with Europe and nearly 45 per cent of the total trade. Next to the United Kingdom the chief countries trading with India are China, Germany, United States, Straits Settlements, France, Japan, Belgium, Ceylon, Austria-Hungary, Italy and Russia. The figures for 1913–14 show that, while Indian imports of American goods were valued at about $15,967,000, Indian exports to America amounted to $72,500,000. The chief articles of export appear to be gunny bags and cloth, of which latter America takes more than all other countries. The trade of India with America, however, is only of short standing, but wisely organized, is capable of being greatly expanded. Before the War, Germany supplied many things this country should furnish, particularly in the electrical and chemical lines, in which it at present holds the market. Other important articles of Indian export are tea, jute and jute manufactures, wheat, oil-seeds, rice, leather, wool, indigo, coffee, teak-wood, cotton and lac. The share of the five chief seaports of India in the total foreign trade (excluding treasure and government stores) in 1914–15 was as follows: Calcutta, $382,019,707; Bombay, $285,567,573; Rangoon, $69,813,963; Karáchi, $95,020,424; Madras, $49,020,000. India has many other seaports of minor importance. The value of merchandise and treasure carried in coasting vessels during 1914–15 was $334,478,604. The trade across the land frontiers is steadily increasing, the chief item among imports being food grains, and among exports cotton goods. Much greater than her trade with foreign countries is the internal trade of India, but no returns of its amount are available. It is mostly in the hands of natives, and to a large extent in those of particular groups or castes. It is still carried on, as it has long been, at village markets, town bazaars, religious fairs and similar gatherings, but the development of railway and canal communication and the transformation in the system of agriculture have already altered its character in many ways.

Manufactures.— The domestic industries of India, such as weaving and spinning, pottery, brass-work, iron-work and art work of many kinds, continue to be practised after ancient methods all over the continent of India. But Indian fabrics and products, made on a small scale by workers at their homes, have for years past been giving way before the cheaper, less artistic, and often less durable cotton yarn and fabrics, and the iron or steel products of British factories. Meanwhile an important manufacturing industry has been growing up, and steam-power factories are at work, among which those for spinning and weaving cotton, for spinning and weaving jute, for making paper, for husking and cleaning rice, for sawing timber, and for brewing beer, are the most important. Steam power is also largely employed in factories, on tea gardens and indigo estates. In 1912 the number of cotton-mills in British India and native states was 241, containing 85,676 looms and 6,100,632 spindles, and giving employment to 240,513 persons. Of these mills 136 were in Bombay Province (80 in Bombay City), the rest being in Madras, Bengal, Central Provinces, United Provinces, Burma, Punjab and Berar, besides some of the native states. The number of jute-mills was 61 containing 34,033 looms and 708,716 spindles, and employing over 204,092 persons. All the jute-mills are in Bengal, except one in Cawnpore, which is the chief manufacturing centre of the United Provinces. Four woolen mills produce blankets, serges and cloths worn by the army and the police. The largest brewery is at Murree, in the Punjab Himalayas. Among other industrial works of importance are silk-mills, soap-factories, tanneries, iron and brass foundries, sugar-factories, coffee-works, cotton-presses and ginning-factories, jute-presses, rope-factories, oil-mills, cutch and lac factories, flour-mills, ice-factories, pottery and tile factories, bone-crushing works, tobacco and cigar factories, silk filatures, glass-factories, dye-works, indigo-factories, printing-presses and dairy farms. The total number of persons employed in all these manufacturing industries is about 700,000. The daily wages of unskilled labor in a factory vary, according to locality, from 2 to 4 annas (4 to 8 cents).

Shipping and Navigation.— In 1913–14 8,617 vessels of 17,386,408 tons burden entered and cleared the ports in British India, as against 8,001 vessels of 12,910,823 tons in 1908–09. Of these 4,951 were of British nationality, 1,697 native, 503 British Indian and 1,466 foreign.

Railways and Roads.— The first Indian railway, from Bombay to Thana, was opened in 1853. The main trunk lines constructed from that time till about 1875 were built and man-

aged by private companies on whose capital the Indian government guaranteed a fixed rate of interest, generally 5 per cent. The government in return for this assistance, exercised a general control over the companies, and reserved the right of buying the undertakings at specified dates on stated terms. In 1870 Lord Mayo initiated the policy of railway construction by direct state agency, but in more recent times several lines have been constructed by "assisted companies." Several of these latter lines have been taken over by government. There are also native state railways constructed from capital borrowed by native states, but generally worked by a staff employed by the government of India or by the trunk railway companies to whose lines they serve as feeders.

The importance of railroads in India is largely increased, in a governmental sense, by reason of their forming strategical links between the various military cantonments through which the vast Indian population is held in check by a comparatively small army of British soldiers. This, more than any other incentive, has hastened the development of railways in India.

The main lines are four in number, and are known as the Bombay-Calcutta, Madras-Calcutta, Calcutta-Simla and the Bombay-Madras lines. The first crosses the great northern plain, the last the great southern plain of India, and are both connected by means of branch lines with all the large cities of the empire. These great trunk lines have also been extended to the farthest limits of India, and even into adjoining territories, as where the line which crosses the Indus at Sukkur enters Afghanistan, the terminus being not more than 60 miles from Kandahar. There is also the Burman line, which passes up the valley of the Irawaddy in the direction of the Chinese frontier. These three main lines, with their several offshoots, may be roughly sketched as follows: In the north, a direct line from Bombay on the west coast to Calcutta on the east coast; a line to Benares from Bombay; a direct line from Calcutta to Peshawar, on the Afghanistan border, by way of Benares, Delhi and Lahore; a line from Lahore to Karachi, with the branch line between these two cities to Kandahar. In the south, the main line between Bombay and Madras through Hyderabad; the line from Bombay to Goa, and from Goa to Madras, with lines connecting with Calicut and with the line from Madras to Tuticorin in the south. Since 1916 a railway built across "Adam's Bridge" at a cost of $3,700,000 connects Ceylon with India. In Indo-China, the main line from Rangoon to the Chinese frontier, by way of Mandalay, and with an extension to Bhamo and another to Meaday. (It is proposed to extend the Bhamo line to Bishi and the main line to Yun-nan in China with offshoots to Tching-tou and Haipong).

The total mileage of railways in India on 31 March 1914 was: State lines, 25,832 miles; companies lines guaranteed under modern contracts, 32 miles; district board's lines, 155 miles; branch line companies receiving rebates from traffic interchanged with main lines, 1,388 miles; companies lines (a) subsidized by the government of India, 449 miles; (b) subsidized by local governments, 137 miles; (c) subsidized by district boards, 302 miles; (d) and companies lines receiving land only from the government of India, 1,760 miles; unassisted companies lines, 74 miles; leased lines, 79 miles; native state lines, 4,363 miles; and foreign lines, 74 miles; total, 34,645 miles. The total capital outlay of these railways till the end of 1913 was slightly over $1,500,000,000; the total number of passengers carried in 1913 was 457,717,000; and the total weight of goods and live stock carried 82,613,000 tons. The chief highways are well metalled with a kind of limestone called *kankar*, but in Lower Bengal and similar districts, where there is no available stone, roughly-made bricks are used for road-metal. Many of the roads are planted with avenues of trees.

Posts, Telegraphs and Telephones.— The number of post-offices in India in 1914 was 68,077. The total number of letters and postcards and all pieces of mail was 1,080,908,000. The Indian telegraph system consisted in 1914 of 81,593 miles of line, 321,801 miles of wire and 283 miles of cable. The number of telegraph offices is about 7,000 and the annual number of messages over 16,000,000. There are telephone companies at important towns, such as Bombay, Calcutta, Karachi, Madras, Maulmain, Rangoon and Ahmadabad. India is now in direct telegraphic communication with the Straits Settlements and the Australian colonies, with Europe via Suez, via Teheran and via Turkey, with the East Coast of Africa and with China via Bhamo; and there are several wireless telegraphic stations under government control.

Canals and Irrigation.— In some parts of India, such as Sind, cultivation is impossible without irrigation, while in others, such as much of Lower Bengal, irrigation may be regarded as quite unnecessary; but in the greater part of all the provinces the rainfall is either insufficient for the proper cultivation of the soil, or so uncertain as to expose the agriculturists to the constant risk of scarcity and even of actual famine. Hitherto irrigation has had only a secondary place in the governmental development of India, the attention of the administration having run more to railways. The profit on the railways is, on an average, 5 per cent, while the expenditure on irrigation works on which only $125,000,000 have been spent, the profit has averaged 8.22 per cent; on the Eastern Jumna canals the profits rise to 25 per cent. The annual irrigation expenditure under the present Indian budget comes to only $7,500,000 for major and minor works together.

Many of the irrigation works now administered by the Public Works Department are simply old native works restored, and in some cases extended or improved. Tank irrigation is common in some districts, especially in southern India, and the tanks are mostly of native origin. Many old tanks, however, have been repaired or improved by the British government, and new ones have been constructed in Madras (where there are now 60,000 tanks), the Bombay Deccan and Ajmir Merwara. In parts of Baluchistan, where the rainfall is scanty and capricious, water for irrigation purposes is drawn from underground springs by means of tunnels driven into the hillsides. The most common method of irrigation in India, however, is that by wells, which prevails over large areas

in all the provinces. Canal irrigation was practised to some extent by the native rulers, but all the important canals have been constructed since the British occupation. Irrigation canals are of two kinds, inundation and perennial. The latter are furnished with permanent headworks and weirs, and are capable of irrigating large areas throughout the year, independently of the local rainfall; while the latter, which are peculiar to Sind and the Punjab, are simply earthen channels supplied with water by the annual rise in May of the Indus and its affluents. Many of the perennial canals are, either in whole or in part, used for navigation, and there are, besides, a few canals used for navigation alone. In 1913–14 throughout India, 20,446,248 acres were irrigated by canals; 6,303,740 acres by tanks; 13,866,918 acres by wells and 6,219,113 acres by other sources. State irrigation works accounted for nearly 25,000,000 acres in 1913–14. Aside from interest charges, the net revenue from these works was about $21,125,000, while the estimated value of crops was $271,250,000.

Money, Weights and Measures.— By an act passed in 1835 a uniform monetary system was established throughout India, with the Madras silver rupee of 180 grains, .916 fine, as the monetary unit. The rupee was subdivided into 16 annas, and each anna into 12 pies (or four pice). Silver was made the universal standard of value, and the silver rupee and half-rupee were declared to be legal tender to any amount. The other smaller coins were made legal tender up to the value of one rupee; 100,000 rupees are called a lakh or lac, and 100 lakhs a crore. Under this system large sums are punctuated differently from the usual European method. For instance, the Indian Post-Office Savings banks' statistics show that in 1913–14, 9,824 banks with 1,638,725 depositors had to their credit 231,675,467 rupees, or according to the Indian method 23,16,75 467 rupees, reading as 23 crores, 16 lakhs and 75,467 rupees.

The coins under this system are: Silver — Rupee, half-rupee, quarter-rupee and one-eighth rupee; Bronze or Copper — Three pies (or a pice); six pies, one pie. There are also gold coins called mohurs, but they are not a legal tender, and there is no fixed ratio between them and the silver coins. The rupee was formerly valued at 48 cents, but it has fluctuated greatly, mainly downward. In January 1895 it was nearly as low as 24 cents; but since 1898 the sterling value of the rupee has been about 32 cents. In view of the steady depreciation of silver, and the consequent financial embarrassments and burdens to which the government of India was subjected in its dealings with gold-standard countries, an act was passed by the Governor-general's Legislative Council in 1893 providing for the closing of the Indian mints to the unrestricted coinage of silver for the public. Notifications were issued simultaneously providing (1) for the receipt of gold coin and gold bullion at the mints in exchange for rupees at a ratio of 1s. 4d. (or 32 cents) per rupee; (2) for the receipt of sovereigns and half-sovereigns of current weight at treasuries, in payment of government dues, at the rate of 15 rupees for a sovereign and 7½ rupees for a half-sovereign; and (3) for the issue of currency notes in Calcutta and Bombay in exchange for gold coin or gold bullion at the rate of one government rupee for 1s. 4d. By a notification of 11 Sept. 1897, sovereigns and half-sovereigns of current weight are also received at the reserve treasuries, at the rate of rupees, 15 for the sovereign.

An act (XXII of 1899) declared the sovereign legal tender, 15 rupees to the sovereign. It was, however, decided not to coin gold in India, a proposal to coin gold is now under consideration.

The Coinage Act of 1906 provided for the introduction of a subsidiary nickel one-anna piece and the substitution of a bronze currency for the existing copper coins. The coinage of copper was accordingly discontinued with effect from 1 Aug. 1906. The issue of the nickel one-anna piece was commenced with effect from 1 Aug. 1907.

Since 1900 rupees have been coined as required to meet public demands, the government purchasing the silver and paying for it mainly with the gold accumulated in the paper currency reserve. The entire profit accruing to government on the coinage up to 31 March 1907, and during the year 1912–13, and half such profit for the years 1907–08 and 1908–09 were placed to the credit of a separate fund termed the gold standard reserve, with the object of ensuring the stability of the currency policy of the government. Any profit arising from this source in future will be credited entire to the gold standard reserve, until such time as the gold and gold securities in the gold standard reserve shall attain to a total of 25,000,000 sterling. At 31 March 1914, the reserve amounted to about 25,5000,000 sterling, inclusive of 4,000,000 lacs of rupees held in India.

On 16 July 1861, an act was passed by the government of India providing for the issue of a paper currency through a government department of Public Issue, by means of promissory notes. Circles of issue were established from time to time, as found necessary, and the notes were made legal tender within the circle for which they were issued, and rendered payable at the place of issue, and also at the capital city of the presidency. Subsequent legislation has relaxed the rigidity of the circle system. Notes of the values of 5, 10, 50 and 100 rupees are now legal tender throughout British India, and the limitation of currency to the circle of issue is confined to notes of higher denominations. There are now seven circles of issue with their headquarters at Calcutta, Bombay, Madras, Rangoon, Cawnpore, Lahore and Karachi.

By the Measures of Length Act of 1889 the British Imperial yard of 3 feet or 36 inches was made the standard of length for the whole of British India. The most important of the old native measures of length was the *gaz* of Bengal, which was practically equal to a yard. An act was passed in 1871 to prepare the way for the adoption of a uniform system of weights and measures of capacity throughout British India. The unit and standard of weight established by the act is the *ser*, which is equal to a kilogram or two and one-fifth pounds. The unit of capacity was declared to be a measure containing one ser of water, at its maximum density, weighed in a vacuum, and is thus equal to a litre or one and three-quarters pint. Among native weights the most important are the tola (Bengal) of 180 grains, and the Imperial or

Indian maund of 40 seers, equal to 82 2/7 pounds.

Government.—The government of the Indian Empire is regulated by an act passed in 1858, by which all the territories formerly possessed by the East India Company are transferred to the Crown, and all the powers of the said company exercised in name of the sovereign, all taxes being received and disposed of for the purposes of the government of India alone. His majesty's secretary of state for India is invested with the powers formerly exercised by the company or the board of control, and he must countersign all orders and warrants under his majesty's sign-manual. He is assisted by a council of from 10 to 15 members, two of whom are natives of India. The secretary for India fills up vacancies in the council. The members receive a salary of $6,000 a year payable out of the revenues of India, and they hold their office for 10 years. All orders sent to India must be signed by the secretary, and all dispatches from the Indian government must be addressed to him. The executive authority in India is vested in the governor-general or viceroy appointed by the Crown, and acting under the direction of the Secretary of State for India. He has a salary of 250,000 rupees, or about $83,500. The governor-general in council has power to make laws for all persons, whether British or native, within the dominions subject to the British Crown, and for all British subjects residing in allied native states. His council consists of six ordinary members, of whom one is a native of India, and one extraordinary member, namely, the commander-in-chief. There are 10 departments — Home, foreign, finance, army, public works, revenue and agriculture, commerce and industry, legislative, education and railways. The council is expanded into a legislative council composed of 38 official and 32 non-official members, the members have the right of supplementary interpellation. Bengal, Madras and Bombay are ruled by governors with legislative councils. The united provinces, Punjab, Burma, Bihar and Orissa are ruled by lieutenant-governors with councils. Chief commissioners rule over Assam and North-West frontier province and Coorg.

Finance.— The gross revenue estimated for 1915–16 was $401,734,500, and the gross expenditure charged against revenue $415,586,000. The total public debt of India on 31 March 1915, was $1,535,575,115, of which $650,251,330 represented the debt in India, and the rest the debt in England. The largest item in the revenue is that derived from land, which amounted in the year 1915–16 to $110,248,000. (See paragraph on *Land Tenure and Revenue.*) The revenue from forests was $10,579,000, and the total amount of tribute received from native states was $3,066,500. The revenue from opium on exports amounted to £4,645,000 in 1908–09 and to £8,990,000 (estimated) in 1915–16. The opium revenue is raised partly by a monopoly in Bengal, and partly by the levy of a duty on all opium exported from native states. The cultivation of the opium poppy is absolutely prohibited in British territory, except in certain parts of Bengal and the united provinces of Agra and Oudh, but a few thousand acres in the Punjab grow it for local consumption. The opium revenue is being reduced as the export to China is now entirely stopped. The revenue from salt is $16,910,500. The salt revenue is raised by a duty on all salt imported into, or manufactured in India, the duty being now one and one-half rupees (50 cents) per maund, except in Burma, where it is one rupee (32 cents) per maund. The native sources of salt supply are the coast, especially the Rann of Cutch (Baragra salt) and Maurypur (Sind), the salt lakes and pits (especially Sambhar Lake) of Rajputana, and the salt mines (especially the Mayo mine) of the Punjab. Bengal and most of Burma import their salt by sea, much of it coming from England. Several native chiefs have entrusted the management of their salt sources to the British authorities in return for certain payments. The excise accounts for $43,951,500 of the revenue from taxation. The only excisable articles are intoxicating liquors (including toddy, palm-wines and rice-beer), and certain drugs (opium, ganja, bhang, charas), and the aim of the government in taxing these has been as much to reduce consumption as to raise revenue. The government treats the right to manufacture and the right to sell spirits as state monopolies, which are granted to individuals on special terms. Throughout Bombay and the Punjab, the most populous tracts of Madras, the united provinces, Oudh and Burma, and in some parts of Bengal and the central provinces, the central distillery system in some form prevails, and a still-head duty is levied on all spirits manufactured at the recognized distilleries. Except in Madras and some other parts, these central distilleries are government establishments at which private persons distil spirits. In other districts the spirit revenue is raised by farming out the spirit monopoly to the highest bidder, or by licensing the establishment of private stills, the latter method being called the out-still system. The Indian government is replacing the farming and out-still systems as far as possible by the central distillery system. The customs revenue amounted in 1914–15 to $29,715,000. Import duties were abolished in India in 1882, but in 1894 they were reimposed, and now all goods, with the exception of railway material and industrial machinery, food grains, coal, jute, wool and other raw materials, gold and unset precious stones, and some other commodities, are subject to import duty. The amount of the duty is generally 5 per cent, but petroleum is charged at the rate of one anna per gallon, and iron and steel are subjected to a duty of only one per cent. Since 1896 all cotton yarns imported into or manufactured in India have been duty-free, while all woven cotton goods imported from abroad, or manufactured at power-mills in India, pay and *ad valorem* duty of 3½ per cent. There is an export duty on rice and rice-flour of three annas per maund of unhusked rice. A countervailing duty on bounty-fed sugar came into force in March 1899. Revenue from stamps, was $25,535,500. Other important heads of revenue are: Post office, telegraphs and mint (est. 1915–16) net $17,896,000; civil departments, $7,670,000; railways, $75,146,500; irrigation, $23,976,500; other civil public works, $1,280,500. The chief elements in the expenditure are: Railways, $69,250,000; army and marine services, $106,101,500; civil salaries, etc., $95,650,500; charges of collection, $39,683,000; miscellaneous civil charges (furlough and superannuation allowances, pensions paid in Eng-

land, etc.), $39,683,000; irrigation, $25,542,000; famine relief and insurance, $4,860,000; post office, telegraphs and mint, $18,254,000; interest on public debt, etc., $16,532,000. Expenses for buildings and roads are not included.

Army and Navy.— The army in India is under a commander-in-chief, who is under the control of the Indian government; and is divided into a Northern army and a Southern army. The Indian army was composed before the Great War of 75,897 British troops and 161,085 native troops. The native troops are officered by Englishmen. Wherever European troops are stationed there is always a larger native force, and in many of the smaller and less important posts there is a native force only. Much money has been spent in recent years on defensive works and military establishments, strategic roads, etc. India has also a certain number of vessels for coast defense.

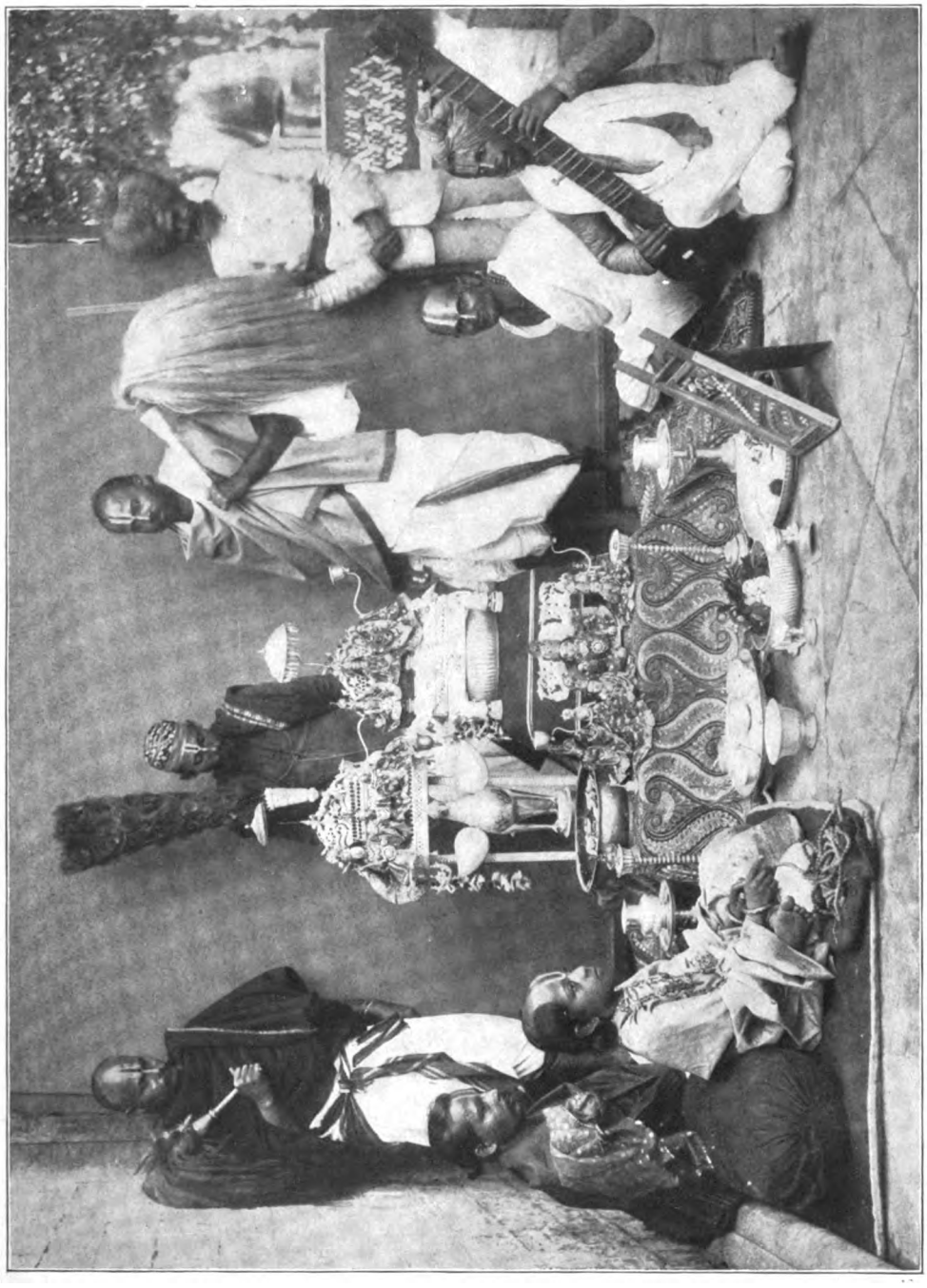
Ethnology.— India is inhabited by numerous peoples belonging to several distinct groups or families. Previous to the Mohammedan ascendency the dominant race were the Hindus, who, however, were not the aboriginal inhabitants nor even the first invaders. From the northwest of India, through Kashmir and down the valley of the Indus, and from Tibet through the passes of the Himalayas, the inhabitants of northern Asia from a very early period migrated southward to the milder and more fertile plains of India. Two great successions of these invasions are recognized as having taken place before the period of authentic history. The first immigrants, of dubious ethnological connections, but commonly known as the Tamil races, appear to have overspread the entire peninsula. Following them the Sanskrit-speaking peoples, called the Hindus, of Aryan speech, dispossessed the Tamil races, and superseded their language in the whole of India north of the Nerbudda. The Hindus subsequently descended into the peninsula and penetrated as far as Cape Comorin; but though their influence on the languages of southern India was considerable in the way of introducing new terms, the grammar and construction of the Tamil languages maintained their place in the districts south of the Nerbudda. The native tribes were not exterminated by these invasions, but are still to be found under various names, as Bhils, Catties, Coolies, Gonds, etc., inhabiting the fastnesses of the mountain-ranges in Bengal, the Vindhya and Satpura Mountains, the Ghâts, etc. The hill tribes and other aborigines in all India are estimated at 70,000,000.

Population.— The first census of all India was taken in 1871–72, but it was not till that of 1891 was taken that a really reliable and comprehensive statistical account of the people of India was available. In 1871–72 the total population of India was returned at 240,931,521, in 1881 at 253,793,514, in 1891 at 287,223,431, in 1901 at 294,266,701 and in 1911, 315,156,396, of which 244,267,542 were under immediate British authority. The total number of Europeans was only 135,995.

France still possesses in India Pondicherry, Karikal, and Yanaon, on the east coast of Madras; Mahé, on the west coast of Madras, and Chandarnagore on the Hugli, north of Calcutta. To Portugal belong Goa, Damão, and the small island of Diu, on the coast of Bombay. These French and Portuguese possessions have a total area of 1,754 square miles and a popuation of 852,752.

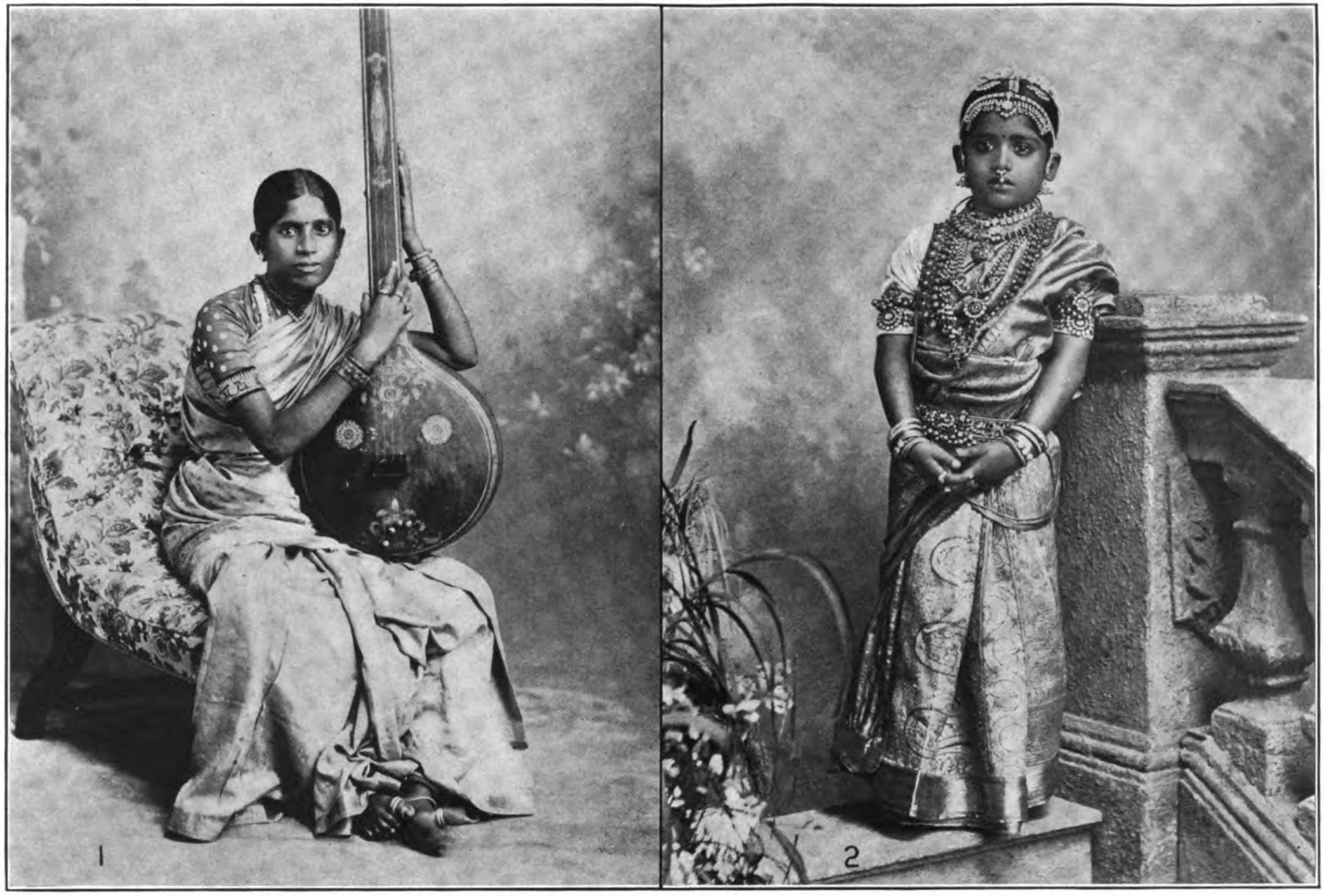
Education.—A system of education for India was inaugurated in 1854 in conformity with the instructions of the home government, and the despatch of Sir Charles Wood (afterward Lord Halifax) of 19 July 1854 is the basis on which the educational system still rests. The fundamental principle of the despatch was that the native languages should be made the medium of communicating European knowledge. Examining universities with affiliated colleges were to be founded, and English and vernacular elementary schools were to be established. The despatch enumerated five government colleges in Bengal; the Sanskrit College and Mohammedan Madrasa at Calcutta; five colleges in the United Provinces; the Elphinstone Institution, Puna College and Grant Medical College in Bombay; the High School at Madras and several missionary schools, as proper to be at once affiliated to the universities. In 1857 the three universities of Calcutta, Madras and Bombay were formally incorporated by law as examining bodies based on the model of the University of London as then constituted. A somewhat different university, with teaching powers, was established in 1882 at Lahore in the Punjab, and in 1887 a fifth university was founded at Allahabad for the northwest provinces. The Education Commission of 1882–83 extended the system of Wood's despatch by placing education on a more popular basis and giving greater recognition to indigenous schools and the first proposals for extending education to Indian women were made by this commission. Educational institutions in India are officially divided into two classes: (1) Public schools, in which the course of study conforms to the standards prescribed by the department of public instruction or by the university, and which either undergo inspection by the department, or else regularly present pupils at the public examinations held by the department or by the university. These institutions may be under either public or private management, and among them are many schools receiving grants-in-aid. (2) Private schools, comprising all which do not fulfil the above conditions. The three main grades of institutions through which the system of education operates are: (1) Primary schools, which aim at the teaching of reading, writing and such elementary knowledge as will enable a peasant to look after his own interests; (2) secondary schools, either English or vernacular; and (3) colleges, the students in which, having passed the matriculation examination of a university, are reading for the further examinations required for a degree. There are also many other colleges teaching special branches of knowledge, such as medicine, law, and engineering, and special colleges for sons of native chiefs and noblemen. In Burma primary education is still very largely in the hands of Buddhist monks. Outside of a few exceptional districts, female education is exceedingly backward in India, but slow progress is being made. There are schools of art in Madras, Calcutta and Bombay, and many of the chief towns have good museums. Many normal schools have been established for the special training of teachers.

The total number of colleges in India in 1913 was 174, of which only 11 were for females.



Feasting the Idols

INDIA



1 An Indian Singer, Madras

2 A High-caste Maiden, Madras

The number of pupils in these colleges was 41,166. Secondary schools numbered 6,595, with 996,611 pupils, 68,154 of the latter being females. The number of primary schools was 127,798, with 4,435,105 male and 833,783 female pupils. The total number of training and other special schools was 6,907, with 197,183 pupils. Beside all these, there were 40,174 private institutions, with 591,754 male and 77,636 female scholars. The total number of educational institutions of all kinds was thus 181,659, of which 17,068 were for females, and the total number of persons under instruction, 7,173,343, of whom 1,008,281 were females. It has been estimated that 22.2 per cent of the boys of school-going age attend school, but for girls the percentage is only 2.3. In nearly all branches of education in India the missionaries have been the pioneers, although at present their work is not important. See INDIA, EDUCATIONAL PROGRESS IN.

Languages, Literature, Art, Music.— See INDIA, LANGUAGE AND LITERATURE OF; INDIA, ART AND ARCHITECTURE OF; INDIA, MUSIC OF.

Religions.— The religions of India like the races are numerous. The most important is the Hindu or Brahmanical, which is very ancient. The earliest period of the Hindu religion is called the Vedic, from the Vedas or sacred books in which its records are preserved. These exhibit several marked phases of transition. The earliest date of the Vedic literature cannot be satisfactorily determined, either from philological or internal evidence. Its latest writings are not more recent than the 8th century B.C. Each Veda consists of three parts, the Sanhitâ, a collection of mantras or hymns, the Brâhmana, which contains the doctrinal and ceremonial development of the religion and the Upanishads. The worship represented in the greater number of the hymns is that of God as nature: Indra, the cloudless firmament; the Maruts, the winds; Ushas, the dawn; Vishnu, Surya, Agni and other deities. These deities were invoked for assistance, and were reminded by the suppliants of their former glorious deeds. In the Vedas no attempt is made to classify the gods and assign them particular ranks. In the Upanishads, a systematic attempt is made to solve the problems of creation, of the nature of the supreme being, and of his relations with the human soul. Some of the Upanishads are legendary in form, others doctrinal or exegetical. These Upanishads, though not in form philosophical, being professedly founded on the Vedas, contain the germs of the great systems of Hindu philosophy which were afterward developed.

A new era in the history of Hinduism begins with the composition of the two great epics, the Râmâyana and the Mahâbhârata, the latter of which was the product of successive ages. The creed had by this time experienced the influence of the theological and metaphysical speculations of the Upanishads, and had assumed a mystical unity. Brahmâ, Vishnu and Siva, the three emanations of the great soul Brahmâ, representing respectively the creative, preserving, and destroying principles, had become the leading objects of worship.

The third or Purânic period of Hinduism correspond with the period of the Christian Era. The Purânas are discussions upon religion and philosophy, in the form of dialogues conducted by sages. They are designed for popular instruction. The epic legends are amplified and explained. The Vedânta philosophy, which had become the basis of the educated creed, still exercises a favorable influence on the popular worship. The creed of the Purânas is that of the masses in India.

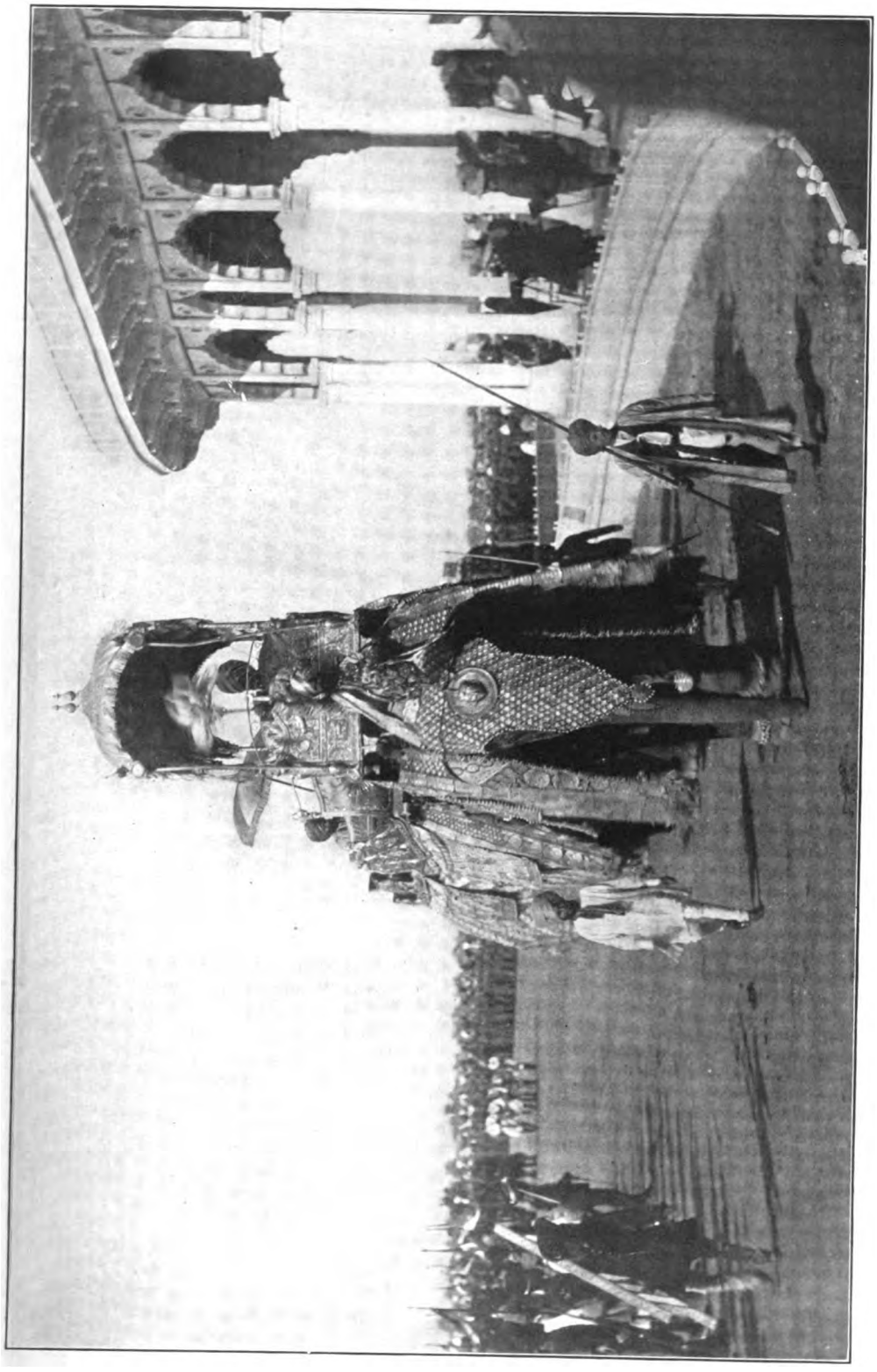
Buddhism arose in India in the 6th century B.C. It prevailed there extensively, and spread itself through the adjoining regions of Asia. It became extinct in India before the 12th century, but still flourishes in China, Japan and in the southeastern regions of Asia, as well as in Nepal and Ceylon. (See BUDDHA). The Jainas or Jains, whose religion is a mixture of the Buddhist and the Brahmanical creeds, are still numerous in Hindustan, and particularly in Gujarat. There are two sects of this creed, called Digambaras and Swetâmbaras. Sikhism is another heretical form of Brahamanism prevalent in the Punjab. There are numerous other minor sects of Hinduism and worshippers of particular gods in the Hindu mythology. The Brahmo-Somaj (q.v.) is a modern Hindu theistic sect. The Parsees or fire-worshippers are descendants of the Persian followers of that religion, who took refuge from Mohammedan persecution on the western coast of India. Their principal emigration was to Surat, and is supposed to have taken place about the end of the 8th century. They were well received in Gujarat. They are now to be found mostly in the mercantile towns in western India, and are most numerous in Bombay. The Mohammedans of India are chiefly native converts, with a very small sprinkling of the descendants of its conquerors from Afghanistan, Persia, Baluchistan and Arabia. They are said to be more liberal-minded than the Mohammedans of western Asia. There is among them a sect of Fakirs like those of the Hindus. There are also numerous Jews in India. On Christianity in India see below under *Christian Missions*. Hinduism recognizes four castes — the Brahmans, or sacerdotal class; the Kshatriyas, or military class; the Vaisyas, or mercantile and agricultural class; and the Sûdras, or servile class. These castes are hereditary. (See CASTE). Such divisions are however, now getting obsolete. Closely connected with the Hindu religion is the collection of laws commonly known as the Institutes of Manu. (See MANU). In the Indian census table of religions (1901) 8,584,349 people are returned as heathens or aboriginals, that is, devotees of some form of animism. Practically, for the purposes of the Indian census, all are classed as animistic who are not locally acknowledged to be Hindu, Mohammedan, Christian, Buddhist, Jew, Parsee, etc., but every stratum of Indian society is in reality more or less saturated with animistic conceptions. Of the total population of British and Native India in 1911, 217,586,892 were registered as Hindus, the greater number of these being in Bengal, the united provinces of Agra and Oudh, Madras, Bombay, Hyderabad and Rajputana. There were 66,647,299 Mohammedans chiefly in Bengal and the Punjab, 10,721,453 Buddhists almost all in Burma; 3,876,203 Christians of whom two-thirds are in Madras and in the Madras States; 3,014,466 Sikhs, chiefly in the Punjab; 1,334,148 Jains, chiefly in Rajputana and in Bombay; 100,096 Parsees and 20,980 Jews mostly in Bombay. See HINDUISM.

Christianity and Christian Missions in India.— The introduction of Christianity into India is variously ascribed by tradition to Saint Thomas the Apostle; Thomas the Manichæan of the 3d century; and Thomas, an Armenian merchant of the 8th century. The earliest Christian church in India of which we have any definite knowledge was Nestorian, but after the Portuguese occupation these Nestorians came into the Roman obedience. In 1663, after the arrival of the Dutch, some of these renounced their allegiance to Rome. In 1665 these latter received from the Patriarch of Antioch a Jacobite bishop known as Mar Gregory, and to this dav they have remained faithful to his Jacobite tenets. Thus, the ancient Nestorian church of southwest India is represented now by two bodies, namely: (1) Catholics of the Syrian Rite, owning the supremacy of the Pope, but retaining the Syrian language and ritual in their services; and (2) the Jacobite Catholics, rejecting the errors of Arius and Nestorius, and following the Nicene creed, though not acknowledging papal supremacy. The spread of the Roman Catholic faith in India was mainly the work of Jesuits from the 16th century onward, the first of these being the celebrated Saint Francis Xavier, who reached India in 1542. The Jesuits were suppressed in the 18th century, but since the re-establishment of the order in 1814 they have made great progress. The Roman Catholics of India are at present organized in seven archbishoprics (Goa, Agra, Bombay, Calcutta, Madras, Pondicherry and Verapoly), and 16 bishoprics (Daman, Cochin, Mailapur, Allahabad, Lahore, Poona, Dacca, Krishnagar, Hyderbad, Nagpur, Vizagapatam, Coimbatore, Mangalore, Mysore, Trichinopoly and Quilon), and there are also several vicars and prefectures apostolic. The earliest Protestant missionaries in India were the Lutherans, Ziegenbalg and Plutschau, who arrived in the country in 1705 and began work at the Danish settlement of Tranquebar. The Lutheran missions were supported from the first by the Society for Promoting Christian Knowledge, and from 1719 till 1844 they were entirely maintained by that body. The celebrated Christian Friedrich Schwarz worked under the auspices of this society from 1750 till his death in 1798. Kiernander, a Dane, was the pioneer of Protestant missionary enterprise in Bengal. He was allowed by the East India Company to settle at Calcutta in 1758, but soon afterward the company changed its policy, and began to prevent missionaries from landing in the country controlled by it. When William Carey, the great Baptist missionary, arrived in 1793, he had to settle on Danish territory at Serampore, 15 miles from Calcutta, and it was not till 20 years later that the company's opposition to missions was withdrawn. Carey was followed at Serampore by Marshman and Ward, whose names will always be associated with his and with the wonderful literary activity begun by him. Other celebrated Indian Protestant missionaries are Henry Martyn and Bishop Heber of the Anglican Church and Dr. Alexander Duff, at first of the Church of Scotland, afterward of the Free Church of Scotland. The head of the Anglican Church in India is the bishop of Calcutta, and under him are the seven bishops of Madras, Bombay, Lahore, Rangoon, Lucknow, Chutia, Nagpur and Travancore. Many American missionaries also work in India.

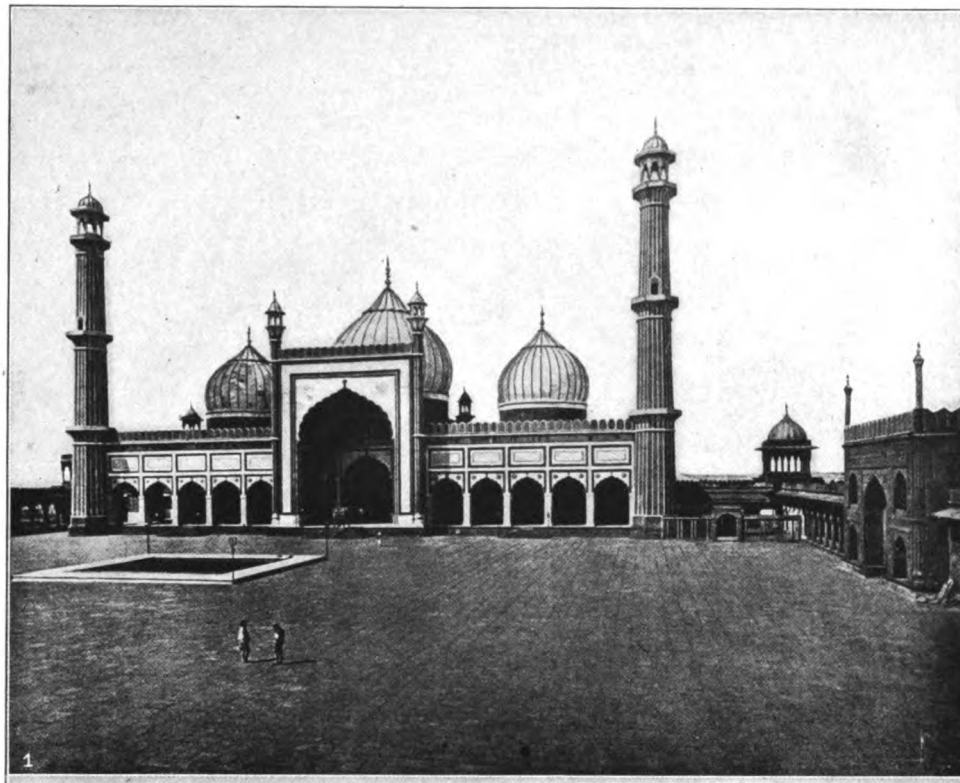
Judiciary.— The law administered by the courts of India is chiefly based on the enactments of the Indian legislative councils, the statutes of the British Parliament relating to India, the Hindu and Mohammedan laws of inheritance and their domestic law in cases affecting Hindus and Mohammedans, and the customary law affecting particular castes and races. Bengal, Bombay, Madras and the united provinces have each a High Court supreme in civil and criminal cases (but with an ultimate appeal to the Privy Council in England, and somewhat similar tribunals exist in the other provinces. There are numerous courts of different grades throughout the country, and many of the judges are natives of India. Various enactments have been passed for the establishment of local government, and there are now upward of 712 cities and towns with municipal government in the different provinces under these acts, and local taxation for police and local improvements has been enforced.

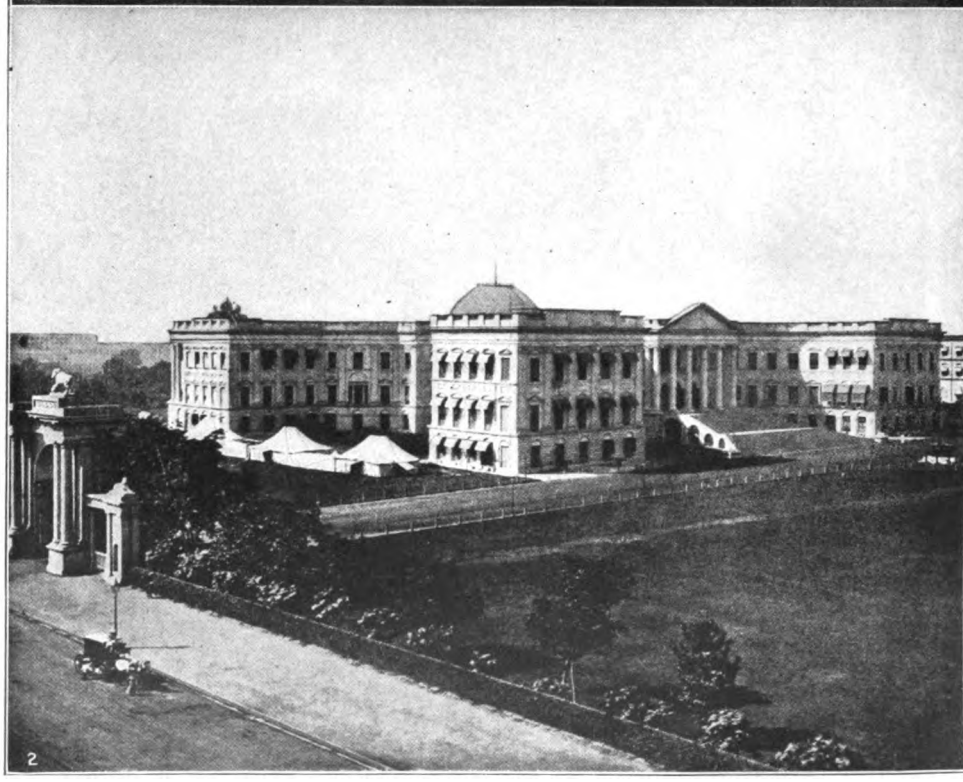
Local Government.—All the provinces, except Madras, are divided into divisions, each under an official called a commissioner, and all, including Madras, are divided into sections distinctively designated districts, the district forming the unit of administration. At the head of each district is an officer called a collector-magistrate or deputy commissioner, the former name implying the twofold nature of his duties, since he is not only a fiscal officer charged with the collection of the revenue from the land and other sources, but is also a revenue and criminal judge, both of first instance and of appeal. Police, jails, education, municipalities, roads, sanitation, etc., all come under his supervision; and he is expected to be familiar with the social life of the natives in all its phases. The districts are sub-divided into lesser tracts, known in Bengal as sub-divisions; in Madras and Bombay as *taluks;* in northern India generally as *tahsils.* The unit of police administration is the *thana* or police circle. An important portion of the administrative staff consists of persons who have received appointments in the Indian civil service, after being successful in competitive examinations held in England; these form what is called the *covenanted* civil service. A certain section of the civil service, known as "the statutory civil service," consists of natives specially selected. The native states are generally governed by hereditary princes, who exercise sovereign power within their own dominions. They are more or less controlled, however, by British influence, a British resident, agent or commissioner being stationed at their courts. They have no power to make war or peace, to send ambassadors to each other or to non-Indian states; they can only keep up a certain specified military force, and they may be dethroned for misgovernment.

History.— Little is known of the political history of India previous to the expedition of Alexander to the Indus, 326 B.C. The 20th satrapy of the Persians comprehended, as Herodotus states, part of the northwest of India. Alexander did not penetrate beyond the tributaries of the Indus, and between his invasion and the Mohammedan conquest there is no authentic political history of India, although the territory was divided among a number of



The State Elephant in India





1 Jumma Musjid, Delhi

2 Government House, Calcutta

rulers of whom Asoka (q.v.), the founder of Buddhism, was one of the chief. At the time of the Mohammedan invasion a Hindu monarchy was the dominant power in India. The conquest of Persia (632–651) brought the successors of Mohammed to the Indus, and they subsequently acquired a temporary hold of some parts of India, as Sind, which they conquered in 710 and lost in 750. The foundation of a more durable Mohammedan empire in India was laid some centuries later. The Kingdom of Ghazna, in Afghanistan, founded, according to Ferishta, by Alpetegin, an ex-governor of Khorassan, in 962, was declared independent by Mahmud in 999. This monarch, of whom as many as 12 expeditions into India are recorded, penetrated in one direction beyond the Jamna; in another he occupied Gujarat and captured Somnauth. He annexed the territory of Lahore to his kingdom, and nominally extended his dominion to the Ganges on the west, and to Gujarat on the south. His last expedition was to Gujarat in 1024. About the middle of the 12th century the Kingdom of Ghazna was divided, and Lahore became the capital of the Indian portion. The Ghaznavid Kingdom of India was overthrown in 1186 by Mohammed Ghori. On his assassination in 1206 Kutb-u-din, his governor in India, established the Afghan or Pathan dynasty at Delhi, and conquered Behar and Bengal. His successor Altamsh conquered Sind (1225), and completed the subjugation of Hindustan. About this time Genghis Khan overthrew the western empire of Ghazna, and founded a great Mongolian empire, which began to extend eastward, and came into collision with the monarchs of Delhi while these were still pushing their conquests to the south and east of India. The Delhi kingdom was, moreover, exposed to frequent commotions, both from the revolts of its own rajahs and from the predatory excursions of the hill tribes. A revolt of the rajahs was suppressed in 1250, and in 1265, after an extensive slaughter of the predatory tribes, a line of forts was constructed to check their incursions. But though frequently defeated the Mongols continued their incursions into northern India. In 1240 they reached Lahore, in 1244 they invaded Bengal; the Punjab was subject to frequent invasions; in 1298 they were defeated at Delhi. A new dynasty, the Khilgi dynasty, arose under the usurper Jelal-u-din in 1288, which was succeeded by a fresh dynasty in 1321, the house of Toghlak. The invasions of the Mongols still continued with greater or less success. During the reign of the last Toghlak king the celebrated Tamerlane invaded India at the head of a great host, took and sacked Delhi in 1398, leaving behind him his deputy Khizr Khan, who now assumed the government. A period of anarchy ensued, which terminated in the conquest of India by the Mogul emperors. Ibrahim, the last of the dynasty of Lo'i, the third in order from that of Toghlak, was defeated in 1526 by Baber, who established the Mogul dynasty in Hindustan. His grandson Akbar succeeded his father at the age of 14 (1556), and during a long reign of about 50 years, terminating in 1605, subdued nearly the whole of India, which, by introducing religious toleration, he succeeded in consolidating into an empire. At the death of Akbar his empire was divided into 15 subahs or vice-royalties, which indicate its extent, namely, Allahabad, Agra, Oudh, Ajmir, Gujarat, Behar, Bengal, Delhi, Cabul, Lahore, Multan, Malwa, Berar, Khandesh, Ahmadnagar. His son Selim succeeded him under the title of Jehanghir. The Portuguese, as will be seen in another section, had already established their territorial dominion in India. In 1615, an English ambassador appeared for the first time at the court of the Mogul emperor in Hindustan. Jehanghir died in 1623, and was succeeded by his son Shah Jehan, who had disturbed his father's reign by rebellions, and during his own reign the country was filled with civil wars. He quarreled with the Portuguese, and expelled them from their settlement at Hugli. During his reign the Mahrattas or Marathas, under their chief Sivaji, began to be an important power in the Deccan. Shah Jehan was deposed in 1658 by his youngest son Aurengzebe, who also murdered his brothers. His reign was passed amid continual contests, both for extending his dominion, and subduing the revolts of the numerous peoples under his sway, both within the limits of India and beyond the Indus. He made war successfully with the Afghans, the Rajputana tribes, and the rising power of the Mahrattas. The Sikhs, a Hindu sect which had been persecuted by the Mohammedans, formed a religious and military commonwealth in the Punjab in 1675. Aurengzebe died at Ahmadnagar, in the Deccan, in 1707. On his death the Mogul Empire began to decline. The succession was disputed by his four sons. Bahadur Shah, who succeeded, died in 1712, and was succeeded by his son Jehundar Shah, who, in the following year, was put to death by Farokshir, a great-grandson of Aurengzebe, who usurped the crown. He was deposed and put to death in 1718 by Hosen Ali. Mohammed Shah, grandson of Bahadur, was raised to the throne in 1718. His reign was disturbed by the insubordinate spirit of his viceroys, and through the defection of one of them, the Mahrattas succeeded in subduing the Deccan. In revenge for an insult Nadir Shah of Persia invaded Hindustan in 1738, took possession of Delhi, and gave it up to be sacked and plundered by his soldiers. The country west of the Indus was ceded to Nadir Shah in 1739. Mohammed died in 1748, and was succeeded by his son Nadir Shah. The empire was now tending to dissolution. The new emperor called in the Mahrattas in 1751 to aid him against the Rohillas, who, in 1749, had defeated the last imperial army ever called into existence. The various states were seized by the former viceroys or by independent chiefs. The Mahrattas, now the most powerful people of India, possessed, besides the Deccan, part of Malwa, and the greater part of Gujarat, Berar and Orissa. The whole empire was at this time in extreme agitation and disorder, every government fearing the attacks and intrigues of its neighbors. Ahmed Shah was deposed in 1754 by Ghazi-u-din, a former vizier of the empire, who set up Alamgir II. In 1757 Delhi was captured by the Afghans, against whom Ghazi-u-din called in the Mahrattas. In 1759 the vizier assassinated the emperor. His successor, Shah Alum, without the shadow of power, escaped from Delhi, and finally took refuge with the British. The rival powers of the Afghans and the Mahrattas, which had been brought into collision by the feebleness of the empire, now engaged in a

fierce struggle for the mastery over its ruins. This terminated at the decisive battle of Paniput, fought 6 Jan. 1761, in the complete overthrow of the Mahrattas. The victor, Ahmed Shah, recognized the grandson of Alamgir as emperor by the title of Shah Alum II; but the empire was now only a shadow, and the native states, which had divided its powers, were destined soon to give way to the superior European commercial organizations which the pursuit of gain had brought to their shores. Henceforth the history of India follows the course of these European colonies, until it is merged in the Indian Empire of Great Britain.

The doubling of the Cape of Good Hope opened up the way by sea to India, and led the Portuguese to the possession of a kingdom in Asia. A few years after Vasco da Gama had landed on the coast of India they were already the most favored merchants upon the whole coast, and in spite of the active jealousy of the Mohammedans, who had hitherto monopolized the lucrative commerce of India, they formed settlements, and made commercial treaties with some Indian princes, in which the latter acknowledged the king of Portugal for their lord. By 1542 the Portuguese ruled from the Arabian to the Persian Gulf; the few ports and islands on the coasts of Persia and India fell into their power; they possessed the Malabar coast ports, and had settlements on the coast of Coromandel and the Bay of Bengal; Ceylon was tributary to them; they had factories in China; and the ports of Japan, to which a tempest had shown them the way, were open to their merchant ships. For 60 years they carried on their lucrative commerce without any considerable rivals. Portugal owed this power to a few able men, among others Francis of Almeida, and Alfonso de Albuquerque. But the successors of the men were not endowed with the same talents, and a revolting abuse of power excited the resistance of the natives, who became united by the sight of their common danger. The union of Portugal with Spain, under Philip II, in 1580, decided the fall of their commercial power in India. The Portuguese, satisfied with bringing the commerce of India to Lisbon, had allowed the Dutch to become the carriers between that port and the markets of Europe. But Philip II closed the harbor of the Portuguese capital to the Dutch ships on account of the revolt of the united provinces, and thus obliged that enterprising people to go to the sources of this commerce. Cornelius Houtmann in 1595 was sent with four ships to India to explore the coasts and gain information concerning the inhabitants and the commercial relations in that region. He returned with favorable accounts, for in this very first voyage treaties of commerce were made with the princes of the island of Java. The hatred of the natives against the Portuguese, who had at times landed here, assisted in the accomplishment of the enterprise. After the Dutch East India Company had formed settlements at Java and upon other points, and had made commercial treaties with several princes of Bengal, there began the long struggle with the rival Portuguese. The stronger and better-served navy of the Dutch enabled them to take one place after another from the Portuguese. In 1607 the latter were stripped by their victorious rivals of the Moluccas; in 1641 of Malacca; in 1658 of Ceylon; in 1660 of Celebes, where the Portuguese had settled after the loss of the Moluccas, to retain, by smuggling, some part of the spice trade; and after 1663 the most important places on the coast of Malabar, where they had longest maintained themselves, fell into the power of the Dutch. The Dutch made Batavia the capital of their eastern dominions. Their power in India began to decline from the time of their wars with Louis XIV. The English began to form commercial settlements in India about the same time as the Dutch. A settlement was formed at Surat in 1613, which became the chief station of the company on the west coast in 1615, and in 1657 the seat of a presidency. A grant of a small territory around Madras was received from the Rajah of Vijianagar in 1639, on which was erected the fort of Saint George. Madras became a presidency in 1654, and till the rise of Calcutta commanded the company's possessions in Bengal. Calcutta, the third presidency, and ultimately the seat of government in India, was settled in 1690, and became a presidency in 1707. The English acted as agents for the Rajahs and Nabobs. The English had to defend themselves against the Mahrattas in Surat in 1664, and early came into collision with the Portuguese and Dutch in the Indian seas. It was, however, the struggle with the French, who followed them, and who had acquired considerable territorial possessions in India, and the alliances of both parties with the native princes, coinciding with the decay of the Mogul Empire, which brought about that long succession of almost unbroken successes by which this great empire was established. The claims of rival candidates for the governments of the Deccan and the Carnatic brought the two parties into collision at various points, and after a succession of maneuvers Dupleix, the French commander, succeeded in compelling the English to take refuge in Trichinopoly. Here Clive, who had already distinguished himself in an unsuccessful attack upon Pondicherry, proposed to carry the war into the enemy's country. In 1751 he besieged and took Arcot, Tinnevelly, Conjeveram and Arani. On his return to Fort Saint David he was despatched by Major Lawrence on another expedition, which he again conducted successfully. Lawrence at the same time gained other successes against the French and their allies. These successes led to the Treaty of Pondicherry in December 1754, in which the French and English agreed to divide their territorial possessions on a footing of equality, and abstain from interference in native affairs. This treaty procured for the English the cession from the French of the Four Circars; nevertheless, they treated it as a dead letter, and immediately began to reduce Madura and Tinnevelly. The French, after vainly remonstrating, followed their example in disregarding the treaty. About this time important events took place in Bengal. Suraj-ud-Dowla, nabob of Bengal, in 1756 besieged Calcutta with a large army, when it was evacuated so suddenly by the English that a considerable part of the garrison was left behind. These had no alternative but to surrender (20 June 1756). Clive, who was sent from Madras with an armament to Bengal, recovered Calcutta on 2 Jan. 1757. War had again broken out between France and England, but the French refused

the alliance of Suraj-ud-Dowla, and maintained their neutrality. Suraj again invested Calcutta, but Clive, though he failed in a night attack, inspired him with so much respect for his means of resistance that he restored the English factories and made peace. Regardless of the benefit he had received from the neutrality of the French, Clive, in spite of the opposition of the nabob, determined to attack their settlement at Chandernagor, which he succeeded in taking. The nabob supported the French till he was attacked by the Afghans, when he became desirous of peace with the English. Clive, however, had determined to dethrone him and replace him by Mir Jaffier, his aunt's husband. In the battle of Plassey, 23 June 1757, the nabob was overthrown, and afterward assassinated by the son of his rival. Mir Jaffier bound himself to pay for his elevation a sum of over £2,500,000 sterling. This plunder was partitioned among the company and the company's servants, with the exception of a small share assigned to the native allies.

While the English in the Carnatic were engaged as collectors for Mohammed Ali in reducing the districts of Madura and Tinnevelly, the French recommenced hostilities. An attack upon Trichinopoly failed (May 1757), but Bussy reduced Vizagapatam, and established the French superiority throughout the Deccan. Count de Lally, who had arrived with a formidable armament in April 1757, besieged and took fort Saint David, 1 June 1758. He afterward besieged Tanjore and Arcot, the latter of which he took. The want of funds, which crippled his operations, compelled him to engage with inadequate forces in the siege of Madras, which, after lasting two months, entirely failed in February 1759. The English took Conjeveram, to which the French retired, by assault. In the following campaign the French, after some successes, were totally defeated by Colonel Coote near Wandewash on 22 Jan. 1760. Their power was now completely broken, their fortresses one after another fell into the hands of the English, and the English fleet, which had the command of the seas, co-operated in the reduction of those on the coast. Pondicherry, their last stronghold, surrendered on 15 Jan. 1765. The English had now established themselves, as a formidable if not altogether a ruling power, both in west and south India; but in both they committed the mistake of greatly over-estimating the resources of the country, and their rapacity and extortion, though they ultimately led to the extension of their power, were the cause of serious and protracted troubles. Mir Jaffier was deposed in favor of his son-in-law, Mir Cossim, who rebelled against English extortions, but, notwithstanding his skilful and vigorous preparations for a war he had anticipated, was worsted in successive engagements, particularly at Gheriah, 2 Aug. 1763, and forced to flee. In revenge he massacred his English prisoners. Sujah Dowlah, the nabob of Oudh, who received him, was defeated and deprived of his dominions, with the exception of Corah and Allahabad, which were given to the Mogul emperor, who formally invested the company with the dewanee or collectorship of revenues and virtual sovereignty of Bengal, Bahar and Orissa, by a firman dated 12 Aug. 1765. The English came to terms with Nizam Ali, subahdar of the Deccan, who opposed their occupation of them, by agreeing to pay him a rent for the territory, and assist him with their forces, but this agreement brought them in 1766 into collision with Hyder Ali, the powerful sovereign of Mysore. Nizam Ali afterward joined Hyder against the English, and both invaded the Carnatic, and, in spite of several defeats, laid waste the country to the gates of Madras. Finally, Nizam Ali deserted Hyder, and the latter concluded a treaty with the English, April 1769, by which their conquests were mutually to be restored.

Notwithstanding the protests and prohibitions of the directors, the administration of the company's affairs left much to be desired even during Clive's governorship, and during the administration of Verelst, who succeeded Clive in 1767, the company's affairs were in extreme embarrassment. Parliament took advantage of the discontent and clamor raised against the company's servants, and in 1773 remodeled the constitution of the company, and appointed Warren Hastings (q.v.) governor-general of India, with a salary of $125,000, and a council of four members, each of whom had $50,000.

His administration was marked by firmness and resourcefulness in upholding British interests, and also by his unscrupulous methods in raising money to carry out his projects. In 1778 war again broke out between France and England. The English captured Pondicherry and Mahé, the last port of the French on the Malabar coast. This place was considered by Hyder Ali as one of his dependencies. In revenge for its capture he seized the passes of the Eastern Ghâts, invaded the Carnatic with an army of 120,000 men and laid waste the country. Sir Eyre Coote was sent into the Carnatic to conduct the war against him. Hyder Ali died in 1782, but the war was continued with his son Tippoo Saib, till 11 March 1784, when it was concluded by a treaty of mutual restitution. In 1784 Pitt's India Bill was passed. In 1786 Lord Cornwallis succeeded Hastings as governor-general. Cornwallis made various administrative reforms for the relief of the people from former exactions, but Tippoo Saib diverted his attention from these peaceful measures by attacking the Rajah of Travancor, now an ally of the British. Having made an alliance with the Mahrattas and the Nizam, Cornwallis invaded Mysore, besieged Tippoo in his capital, compelled him on 9 March 1792 to conclude a treaty, by which he ceded half his territory and undertook to pay the expenses of the war. On the death of Mohammed Ali in 1795, Lord Hobart, governor of Madras, determined to assume the government of the Carnatic, but the plan was opposed by the supreme government and was not carried out. In 1798, Lord Mornington arrived in India as governor-general, when Tippoo Saib was making arrangements to renew his enterprises against the British and soliciting the alliance of France and of Cabul. Early in 1799, Lord Mornington invaded Mysore. On 4 May, he stormed Seringapatam. Tippoo was killed in defending his capital, and Mysore was divided among the British, the Mahrattas and the Nizam. Some time before this (1775) Oudh had agreed to receive and subsidize auxiliary troops for the defense of their territory, and the fortress of Allahabad was ceded to the British, who undertook to defend Oudh against all enemies. Subsequently

in 1801 the subsidy was commuted for the cession of southern Doab, Allahabad, and other territories. During the war with Tippoo, Lord Mornington, whose policy was to induce the native powers to accept British protection and mediation in their disputes, endeavored to induce his allies the Mahrattas and Nizam Ali to come under similar arrangements. The Nizam in 1798 agreed to dismiss his French troops and receive British auxiliaries. The Peshwa, the nominal head of the Mahratta Confederacy, forced by the contentions of the chiefs Holkar and Scindia, accepted the policy of the governor-general. Under the Treaty of Bassein, signed 31 Dec. 1802, Sir Arthur Wellesley restored the Peshwa, driven from his capital by Holkar. Scindia and the Rajah of Berar now entered into an alliance against the British. After a campaign in 1803 distinguished by the successes of Generals Wellesley and Lake, the former defeating the allies at Assaye, 23 September, the latter at Laswaree, 1 November, Scindia was compelled to make peace. He ceded to the British, Baroach, Ahmadnagar, and the forts in the Doab (29 December); the Rajah of Berar ceded Cuttack (17 December). Scindia, thus weakened, accepted the British alliance, and received an auxiliary force to defend him against Holkar, 27 Feb. 1804. A war with Holkar immediately followed, which the skill of that chief in predatory warfare enabled him to sustain with some dexterity, and in 1805 he was joined by Scindia, but the British arms finally prevailed and he was forced to flee. The Marquis of Cornwallis succeeded Wellesley on 30 July 1805. He disapproved of the ensnaring alliances into which the former statesmen had drawn the native powers, and although he died before being able to carry out his views (5 Oct. 1805), Sir George Barlow, who succeeded him, adopted his policy. New treaties were made with Scindia, 23 November, and Holkar, 24 December, restoring their territories and their independence. The new policy was even carried so far as to abandon the petty princes who had trusted to the British alliance. Lord Minto succeeded to the governor-generalship in 1807. During his administration the chief enterprises of the English were directed against the insular possessions of the French and Dutch in the Indian seas. The Moluccas, Java and other islands were taken; many of which were restored at the peace. Some disturbances took place during this period at Travancore, and among the British troops at Madras and elsewhere, which threatened at one time serious consequences. Travancore and Cochin were placed under British management. The Earl of Moira (Marquis of Hastings) succeeded to the governor-generalship in 1813. In 1814 a war broke out with Nepal, which was at first attended with some serious repulses, but was brought to a successful close by Sir D. Ochterlony in 1815, and resulted in the cession of Kumaon. Hastings was also called upon to suppress the Pindaris predatory bands of the former troops of Holkar and Scindia; and the Peshwa of Indore rebelling against a treaty his capital was seized, he himself deposed, and the Mahratta Confederacy dissolved. His ally the Rajah of Nágpur, Scindia, who submitted, and Holkar, who was defeated, were compelled to accept alliances virtually placing them under British protection. This pacification was completed in 1818, and greatly improved the revenues of the districts affected by it. The Marquis of Hastings was succeeded in 1823 by Lord Amherst, under whom the first Burmese War was concluded in 1826 by a treaty ceding to the British the Aracan and Tenasserim provinces together with a large pecuniary indemnity. During the governor-generalship of Lord William Bentinck (1828–35) various administrative reforms were effected, but no great political events took place. Lord Auckland assumed the governor-generalship in 1836. The Afghan War broke out in 1838, in consequence of long and complicated intrigues arising from the advance of Russia in the East, and the mutual jealousy of that power and Great Britain. War was declared on 1 October, the object of the British was to dethrone Dost Mohammed and restore Shah Sujah, a former ruler. It was at first attended by great disasters, particularly the famous massacre of the Khoord Cabul Pass. It was terminated in 1842, under the governor-generalship of Lord Ellenborough, by the evacuation of Afghanistan by the British, after they had relieved their captives and vindicated the superiority of their arms by the capture of Cabul. Sind was annexed to British India after a war conducted by Sir Charles Napier in 1843. After a brief war, arising out of a disputed succession, the dominions of Scindia lay at the mercy of the British, and were disposed of by a treaty dictated by the governor-general at Gwalior in January 1844. While he was thus engaged Lord Ellenborough was recalled and superseded by Sir Henry Hardinge (May 1844), who was soon engaged in one of the most formidable wars the British had yet had to encounter in India. The Sikhs, a politico-religious sect already mentioned, had, under their leader, Runjeet Singh, conquered the Punjab about the beginning of the century. Runjeet Singh, who had always maintained friendly relations with the British, died in 1839, and the government fell into a chaotic state; the army, being without a head, began to commit disorders and threaten encroachments on the British territory. In December 1845 the Sikh army crossed the Sutlej in great force, and in the short war which followed the Sikhs were defeated by Sir Hugh Gough and Sir Henry Hardinge at Moodkee, Ferozeshah, Aliwal and Sobraon. Peace was made at Lahore, by the surrender of the Sikh territories on the left of the Sutlej, and between the Sutlej and the Bias (Jalindar Doab), and the payment of an indemnity. During the governor-generalship of the Marquis Dalhousie, 1848–56, a new war broke out with the Sikhs, and after their final defeat by General Gough at Gujarat, 21 Feb. 1849, the Punjab was annexed to the British dominions. This was immediately followed by the second Burmese War, ending in the annexation of Pegu, 20 June 1853. Sattari, Jhansi, Nágpur and Oudh were, on the failure of the native succession, also annexed to the British possessions, 1852–56. During Lord Dalhousie's administration the extensive scheme of Indian railways and telegraphs was planned and inaugurated, the Ganges Canal opened, and the Punjab Canal began. His last important act as governor-general was the annexation of Oudh, 7 Feb. 1856. The annexation of Oudh, and other provinces, combined with a general feeling of unrest brought about the mutiny of the native army. (See INDIAN MUTINY). He

was succeeded by his friend Lord Canning; in less than a year after the arrival of the new governor-general, a mutiny of the native troops took place at Meerut, on Sunday afternoon, 10 May 1857. The main incidents of the Indian mutiny are the massacre at Cawnpur; the defense of Lucknow, under Sir Henry Lawrence; the taking of Lucknow, by General Havelock; and the siege of Delhi, 14 Sept. 1858. The mutiny sealed the fate of the East India Company, after a rule of more than 250 years, and brought about the transfer of the country to the direct authority of the Queen of England. The Royal Proclamation was read at a grand durbar at Allahabad, 1 Nov. 1858.

The subsequent history has been one of steady advance and general prosperity under the rule of viceroys appointed by the British government.

1 LORD CANNING became the first viceroy of India. He left India in March 1862, and died shortly after his arrival in England.

2 THE EARL OF ELGIN, became viceroy in 1862, and died in India November 1863.

3 SIR JOHN LAWRENCE, afterward created Baron Lawrence, 1864–69. Reformed the finances. Bhutan war. Orissa Famine, 1866.

4 VISCOUNT MAYO, 1869–72. Received Amir Sher Ali Kehan of Kabul in great state at Umballa 1869. Assassinated by a convict in the Penal Settlement at Port Blair.

5 EARL OF NORTHBROOK, 1872–76. The Prince of Wales, later King Edward VII, visited India. A famine in Bengal. The Guikwar of Baroda deposed.

6 EARL OF LYTTON, 1876–80. Famine in South India. The invasion of Afghanistan. The proclamation of the Queen of England, as Kaisar-i-Hind, or Empress of India, 1 January 1877.

7 MARQUESS OF RIPON, 1880–84. Extension of municipal government. Various reforms in favor of the natives.

8 MARQUESS OF DUFFERIN, 1884–88. Third Burmese War. The annexation of Upper Burma with the Shan States. The "Scientific Frontier" of India defined and strengthened.

9 MARQUESS OF LANSDOWNE, 1888–93. The strengthening of the army and the defences of India. Reform in currency, closing the free coinage of silver. Reconstruction of the provinces of India.

10 EARL OF ELGIN, 1894–98, son of a former viceroy. British control of the northwest frontier of India strengthened. Earthquake in Anam 1897. Cholera, plague, and famine 1895. Frontier War. Celebration of the Queen-Empress's Diamond Jubilee.

11 VISCOUNT CURZON, 1899–1905. Dispatched 8,000 British troops to S. Africa 1899. About 20,000 sent to China 1900. One of the worst Indian famines on record. A period of reform and reconstruction. King Edward proclaimed Emperor of Delhi 1 Jan. 1903. Political mission to Tibet 1904. Seven earthquakes April 1905. Resigned August 1905.

12 EARL OF MINTO, arrived in India November 1905. A descendant of a former Governor-General of India. Partition of Bengal Province 1905. Visit of Amir Habib Ullah Khan of Afghanistan January 1907. The New Councils act was passed giving the natives a much larger share in the government of the country than they ever had before.

13 LORD HARDINGE arrived in 1910. He instituted several new reforms. King Edward died and George V was proclaimed King in 1911. Delhi Durbar held in 1911 at which King George and Queen Mary were present. The capital was transferred from Calcutta to Delhi where 22 Dec. 1912, Lord Hardinge made his vice-regal entry.

14 LORD CHELMSFORD arrived as Viceroy, March 1916.

The Nationalist Movement.— Supplementing what has already been written under *Land Tenure and Revenue,* is this quotation from a report by Lord Lawrence, Viceroy from 1864–69:

"The people of India are capable of administering their own affairs and the municipal feeling is deeply rooted in them. The village communities, each of which is a little republic, are the most abiding of Indian institutions."

This statement furnishes the keynote of a modern Nationalist movement which strongly suggests the similar movement in Ireland. Insisting that the Indian national spirit has never died but is steadily growing, the desirability, the justice, the necessity of Indian self-government, is persistently advocated by different types of Nationalists — Extremists who do not recognize the British government, Nihilists, Religious Extremists, Mother Worshippers, Vedantists and Advocates of Organized Rebellion, the Hardayalists, followers of Har Dayal. All these factions have different opinions as to religion, politics and economics, and while most of them would be glad to have self-government established within the empire in the near future, there is practical unanimity among them as to the goal most to be desired for India — complete independence. The organized Nationalist movement began to make its power felt when on 16 Oct. 1905 the old province of Bengal was partitioned by Lord Curzon. The years 1905, 1906 and 1907 were years of passive resistance, during which anti-British propaganda was carried on by means of the press and platform, but force was not used. During this time many Nationalist editors and publishers were sent to prison without any diminution of the campaign. In 1907 the Nationalist party split into two sections, one favoring force and the other passive resistance. The first shot was fired in December 1907, and the first bomb thrown in 1908. Rigorous action on the part of the authorities kept the disaffection under, but the propaganda continued and the lives of several high officials were attempted. In 1911 the king modified the partition of Bengal and ordered the transfer of the capital to Delhi, an action regarded as a triumph of the Nationalist agitation. On 22 Dec. 1912 a bomb was thrown at Lord Hardinge, the Viceroy, who was wounded, and an attendant killed, when he made his first state entrance into Delhi, the new capital. The revolutionaries still continue active, but general loyalty and coöperation with the broad-minded imperial policy was shown during the World War when Indian troops fought with the Allied nations in France and elsewhere.

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INDIA, Art and Architecture of. Although considerable light has been thrown on

Indian art and architecture, a great part of the knowledge that exists at present is vitiated by the fact of the subject having been approached from a very unsympathetic point of view. The fundamental of Indian art is symbolism and foreign students and critics have ignored this fact altogether. As a matter of fact, efforts have been almost altogether directed toward disproving the fabulous antiquity claimed for Indian art by tradition. It is only in very recent times that sympathetic critics have attempted to treat the subject from the right point of view. There is no doubt that the oral traditions in India have built up an absurd halo about the age of the temples; but, to a student of art, age must be a secondary consideration.

Twenty centuries of internecine warfare, the sweeping of the country by foreign hordes, and the several conquests, have naturally contributed to reduce all vestige of art to buildings that cannot be easily destroyed. We have very few examples of the development attained in comparatively ancient periods in the country. Of ancient paintings, we have only a few frescoes in the cave temples of Ajanta, Karli and Ellora. The literature abounds with descriptions of magnificent paintings, carved works in wood and ivory and all the paraphernalia of artistic expression. Ancient Indian history shows that there were cities which could well vie with the magnificence of modern cities, and possessing all the expressions of artistic luxury.

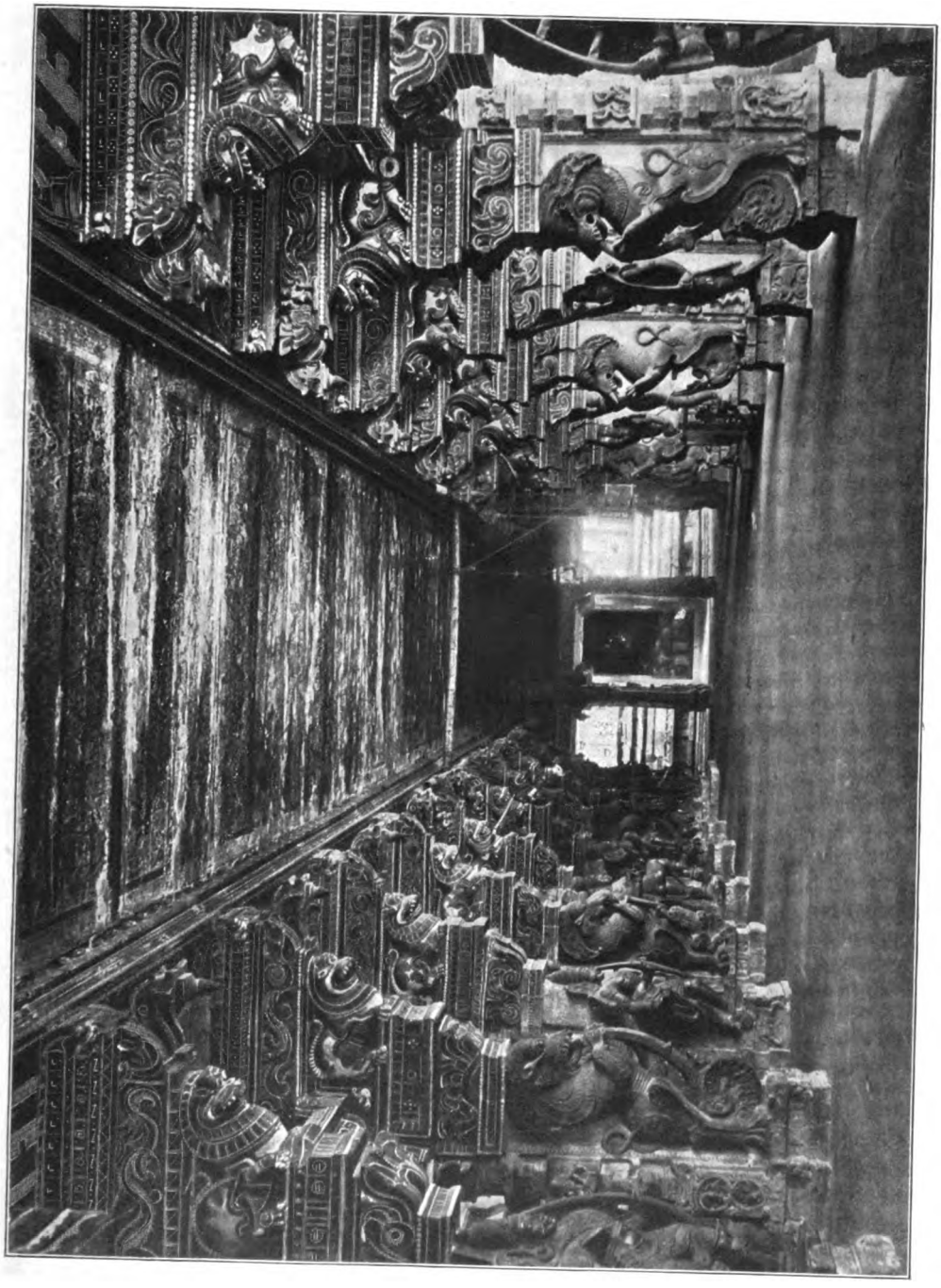
We must judge of ancient Indian art by the temples — the mammoth structures that have existed for centuries. Whether these temples existed before the Christian era, or whether they owe anything at all to ancient Greek, Persian or Roman, are points not worth discussing. All that we know is that the inspiration is not foreign, and that the principles upon which they have been constructed were unknown to any other people. As a matter of fact, some of these structures that exist to-day are marvelous from an engineering point of view. The art of construction of some structures is not only lost, but baffles the engineering science of Europe and America.

There is general agreement on the point that Indian art owes its existence to Buddhism (q.v.). Ancient Brahminism had no temples, and the idea of any worship, but that of God in the form of nature was contrary to the interpretation then put on the Vedic texts. Buddhism was the religion preached by Buddha, hence there arose the necessity for deifying Buddha and worshipping him. The Brahmins fought such deification, and the erection of temples as being unholy. When the country turned away from Brahminism, and when more than 75 per cent of the people became Buddhists, under the powerful proselytizing influence of Asoka, the Brahmins retained their positions by practically incorporating the latter religion into their own. In that process, they took also the temples and developed them. Within a few centuries, they made sure that no Buddha was left in the temples and the images were renamed. In that manner, the worship of the countless Hindu deities became the vogue. To-day, there are at least a thousand mammoth temples in the country, while there are hundreds of thousands of small temples.

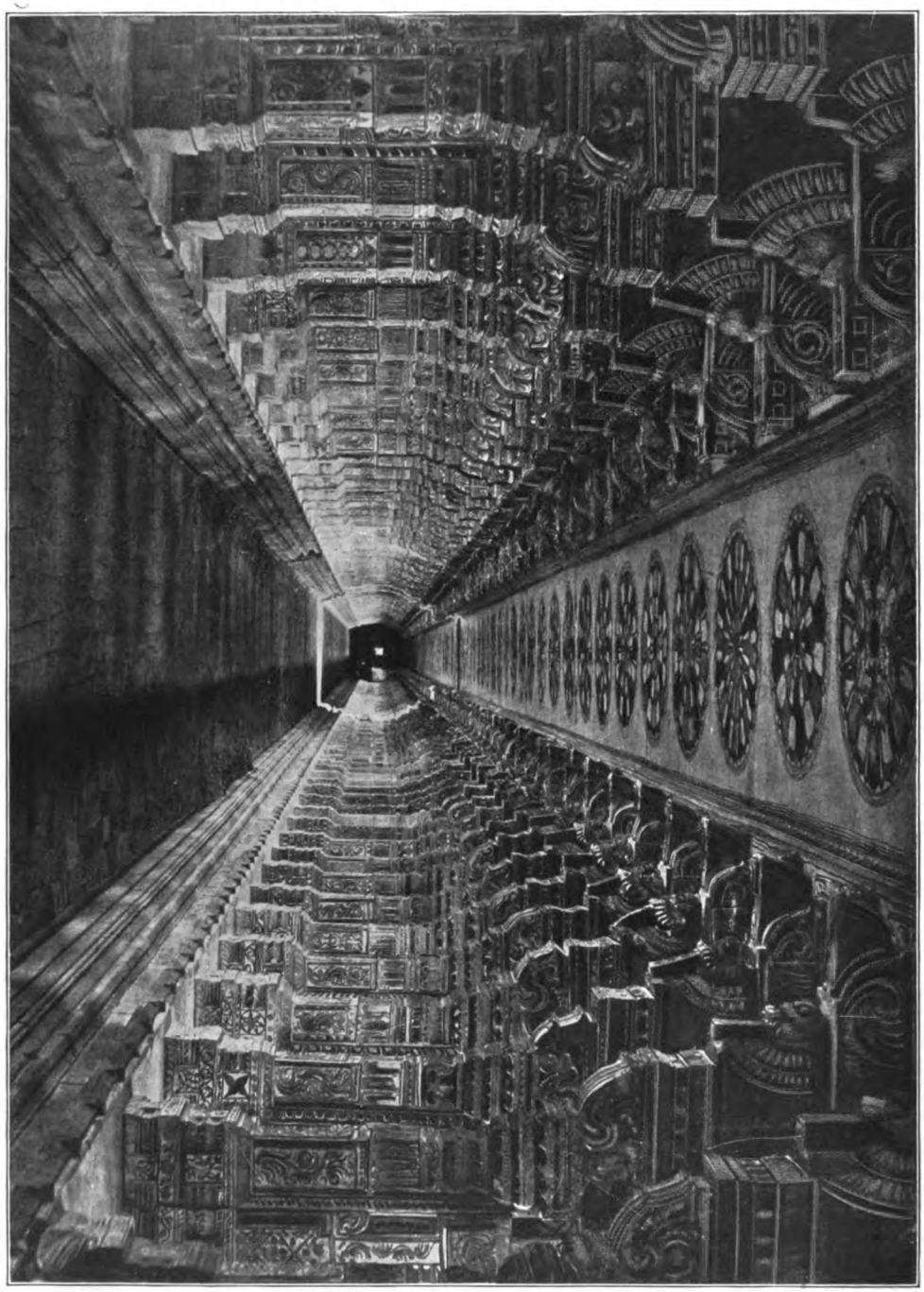
It would take too much space to detail the evolution of the temple. The Buddhists began with the construction of *topes*, in order to commemorate some event or to show that the spot was sacred. Most of these *topes* were constructed in the form of towers. The most notable of them being the Sanchi *tope*—the diameter of which is 106 feet. In the ancient Buddhistic period, there were besides *topes*, temples and monasteries. We have very few examples of monasteries at present, because with the downfall of Buddhism in India, the monastic order died out, and the buildings allowed to go to destruction. The earliest extant temples are the rock-cut cave temples — the date of whose construction is variously put from the 2d century B.C. to the 8th century A.D. There are three notable examples of these, at Karli, at Ellora and at Ajanta. The most wonderful of these are at Ellora. They are a series of caves sunken in the solid rock, extending a distance of three to four miles. The most notable caves are simply halls supported on massive piers, with level epistyles. The piers are richly carved with figures and friezes, and have a sort of cushion capitals and square abaci, and stand round forming a kind of atrium. The Indra court, the court dedicated to that deity, is open to the sky; within the court is a small shrine or temple in the solid rock are two halls — one larger than the other. The Visvakarma cave is a quadrangle open to the sky and surrounded by pillars. It leads into the atrium with three aisles and an apse. The most magnificent of all existing structures and significant as a purely Hindu work, is that part called the Kailas, which means literally, Heaven. The Kailas chambers and halls are sunk into the rock, and occupy a space 270 feet deep and 150 feet wide. The roofs are solid rock, supported by pillars, or rest on the walls or on the divisions of the assemblage of chambers. There is a porch, on each side of which, are two columns. This leads into the hall supported on 16 such columns, leading into a sort of adytum, around which is passage space and five chambers. The whole forms a temple with its usual appendages, exactly like one built on the ground, and around this is a wide open space with a colonnade or cloister encircling the whole. A great part of it is open to the sky for the sake of light and air but the work is entirely cut out of solid rock.

A distinctive architecture was that of the Jains. The Jain temple has a distinctiveness of its own, and the most famous example of an ancient temple is the Vimala-Sah on Mount Abu. The Jains, the Buddhists and later on, the Brahmins, all adopted the tower as the essential of the temple. The tower developed out of the dome, and the Indian dome has no boussoirs radiating from the centre, as in European architecture. The courses are all horizontal, and the domes are necessarily pointed in section, for they would not stand if circular. It requires no abutments and has no lateral thrust.

Although, the principles on which these temples have been reared are more or less the same, there is a marked distinction between the temples of southern India, and those of the north. At present, south India has more magnificent structures than the north. This is due probably to the fact that owing to the lateness of the Mohammedan incursion, the temple



Hall in Temple, Madura



The Great Hall in the Hindu Temple on the Island of Rameswaram

buildings were saved from destruction. The most famous of the southern temples are the temple at Tiravalur, the one at Tanjore and the one at Ramasvaram. The one at Ramasvaram has a hall 700 feet long and 150 feet wide, and it is so built that, although the light enters through one opening, there is not a dark corner in the whole of the building. The Tanjore temple has a tower 200 feet high, and resting on a base 83 feet square, and it is so constructed that it throws no shade. All the pillars of the southern temples, as well as the towers, are richly ornamented with carvings in relief. Among the most notable of northern buildings is the Black Pagoda of Kannaruc. The temples at Barolli and at Benares also need particular mention. The designs are great and the ornamentation profuse.

It is curious that, perhaps the most inspiring, and the greatest specimens of Indian art should be found outside of India. The Aughor Wat in Indo-China, and the temple at Mathura in Java are known to be the wonders of the world, and even those who have no appreciation of Indian art are inspired by the vastness of the structures, the greatness of the design, and the profuseness of ornamentation. These two structures cover very wide areas, and are now in ruins. They were reared by the Hindus when they ruled over those territories; and the temples fell into ruins when the Hindu conquerors had to leave those countries and come back to India.

The architecture of Siam and China, as well as that of Japan is wholly Indian. The Siamese *wats* and temples were reared by the Indian architects and resemble more closely the temples of India than those of Burma. The Chinese, who were great painters, never developed architecture, as their buildings were almost altogether in wood. The introduction of Buddhism into China was followed by the introduction of temple architecture, and the Chinese took to building with great avidity. The Japanese architecture has been purely employed in building temples to Buddha, and is still preeminently Indian.

It should not be imagined that there was only temple architecture in ancient India. There have been magnificent buildings, great from the point of view, both of size and height. Very few of them, however, are left, and such buildings as exist to-day have all been of a later date. The one notable building which is now in ruins is the University of Nalanda, near Patna, which flourished before the 11th century. The ruins are still to be seen, and it is stated that the university housed 20,000 students, Later Indian art of the best kind is to be seen only in southern India. The hall in the palace at Madura is an example of pure Indian architecture. In the north the Mohammedans brought with them the Saracenic art; and in course of time, the native Hindu and the Saracenic art blended well and produced a new type. The most noted example of this blending is the Taj Mahal (q.v.) said to be one of the nine wonders of the world. It is built of the purest marble on the banks of the River Jumna, and is described as a dream in marble. The Jumna Masjid in Delhi, and the several palaces that exist in different parts of the country also exhibit the result of the blending of the two styles. The basis of all architecture in India has, however, been the old Indian style, and the craftsmen have always been Hindus.

There are some buildings of distinctive Saracenic architecture, which are mostly mosques, or the places of worship of the Mohammedans, who form one-fifth of the population of India. The Indian mosques have, however, a very distinct touch of the Hindu craftsmen, especially with respect to capitals and the ornamentations. Saracenic architecture is distinctive for the elaboration of detail, and the Hindus took it and developed it. Possibly as the effect of Saracenic influence, later Hindu temples have almost a surfeit of detail work. In the temples of southern India, it is a common sight to see columns 15 feet high and 4 feet square, having as many as 10,000 figures carved in relief — every figure being distinctive. A column in the temple of Kumbakonum has the whole story of Ramayana carved in relief.

The secular buildings of later date are mostly halls and palaces. The Mohammedans revived the art of the dome, which had perished shortly after the Buddhistic period. A hall at Bijapur has a dome with a diameter of 100 feet, resting on columns without any support. There is not a piece of wood or steel in the whole structure, and it is constructed out of brick and mortar. The dome has been standing for at least 400 years, and is as good and strong as if it were built yesterday. Except in the wealth of detail, which varied with different centuries, the principles of India architecture have undergone no modification.

The art of statuary in India consists principally of casting the figures of the deities in bronze and similar alloys, and cutting the figures in stone. An elaborate science of statuary was built up, and at one time it appears to have been a serious study; but craftsmanship in India has always been a tradition, handed down from father to son. With the elaborate developments of the caste system, artistic knowledge became the possession of a body of people whose claim was based on birth. The technique of the art was considered a secret and kept in the family, as it were. As the religion allowed free play to the art of statuary, and as the kings and people of wealth considered building temples a passport to heaven, there was room for any number of images of deities. Later Hindu texts, especially the Puranas, gave room for the infinite play of fancy. Gods and goddesses in all shapes and forms were introduced, and imagination had the freest play. For instance, Siva, the favorite deity of the south, is represented with several hands and feet. Art critics of Europe have considered these statuaries — monstrosities; but recently the symbolism is being better understood. The Hindu considers his gods as being without human limitations, and the only way in which he could express this thought was by the creation of extraordinary attributes. Once this symbolism is understood, statuary in India will take a very high place in art. The making of alloys was known in India long before it was known in other parts of the world. The Iron Pillar at Delhi is a striking example of the engineering skill of ancient India.

Ancient works show that in ornamental work in gold and silver ancient Indians were adept. We have, however, not many examples of these at present, principally because the jewelry of the

temples in the north has been looted by the invaders. Even the tools appear to have been lost, although at present, some of the works done by gold and silver-smiths are in no way inferior in design and finish to those made in Europe or America.

For a number of centuries, painting in India has remained a lost art. The frescoes in the cave temples are recognized by art critics as representing a very high stage of development of the art of painting. There is a very long gap until we arrive at the Mohammedan period, during which time, noteworthy paintings saw the light. The special characteristic of Indian painting has been its magnificent detail, although some consider it a fault that a great number of subjects and figures should be crowded in a single canvas. It has also been customary to paint, on the walls of temples, the mythological stories. As a rule, these paintings have not been of high order.

Recent developments in painting have been very satisfactory. A distinctive school has sprung up in Bengal, and it shows traces of European influence. The most noteworthy painters are Nandalal Bose and Ganguly, who have also gone for their principal subjects to Hindu mythology. Most of the principal centres have native India artists, who are successfully developing a new school. Owing to the want of support, and the ignorance about Indian art, progress is very slow at present.

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SRINIVAS R. WAGEL.

INDIA, Educational Progress in. The work of engrafting a system of modern education, essentially of an English standard, on the Indian Empire could not be hurried in view of the enormous labor involved and the vast population to be reached. The original Hindu system imposed upon every one of the higher caste the obligation to teach, primarily instruction was oral. Separate schools of law, of religion, astronomy, astrology and medicine came later. The villages were centres for schools in industrial art for which the Indian natives were adapted. The village boys were taught the vernacular and received ethical foundations in proverbs, stories and verses from the lips of the teacher. The Buddhists were no less exacting in their schools. It was the province of the Mohammedans as early as the 11th century, by their more democratic educational methods, universally established in the shadow of the mosque, to modify the rigid caste notions of India, their power being aided by the establishment of the Mogul Empire in the 16th century. With the rise of Christian influence in the 18th century and for a century later the missionary was the teacher. In 1813 on the renewal of the charter of the East India Company, an educational grant was included, although in 1780 and 1791 two private institutions were founded in Calcutta and Benares. A greater impetus was given to education in 1835 on Lord Macaulay's arrival, to promote the knowledge of European literature and science through the English language, and all agencies, missionary and private, municipal, provincial and governmental, were quickened in their activities. In the following decades, however, it was realized that the movement failed to prove popular — it seemed to be utilized by natives who desired government offices, but not by the masses of the people. Hence special commissions were appointed in 1882 and 1894 to improve the system from a practical point of view with the best results. While before the new century primary education reached the mere fringe of the population, in 1908 a marked advance was made. In 1907–08 the primary pupils in all the 10 provinces numbered 5,708,138, a 22 per cent increase over the previous year, and similar growth was noticed in every grade from the highest to the lowest.

The government's wisdom was shown in 1901 when an inspector-general of agriculture, with a staff of experts, was appointed. In 1903, a gift by Mr. Henry Phipps made possible the Imperial Agricultural College and Central Research Institute at Pusa in Berar. In 1905 the government set aside 20 lakhs of rupees ($644,000) was devoted to agricultural research and instruction. In a few years 60 experimental farm schools, in addition to demonstration plots, were established. Schools were begun and a state technical school, with scholars to be sent abroad for thorough instruction. A further evidence of progress in education is the national awakening toward the need of universities for Indian young men and women under their own auspices. Early in 1916, the University of Mysore was opened, the first of its kind in that part of India which belongs to the Indians and is ruled by them. It is significant that education is compulsory and free throughout this state, in which at latest reports with a population of six millions were 5.436 insitutions, six colleges for men and one for women. The school pupils numbered 214,397, with 26,371 secondary and 934 collegiate. The new university is not an examining body but has a regular university lecture and tutorial system, with the Maharaja as chancellor. Instruction is given in the vernacular current in the state. The course is for three years. In February 1916 Lord Hardinge laid the foundation stone of the new Hindu University at Benares. No candidates are debarred on the score of religion. Instruction in the Hindu religion is compulsory for Hindus. The central Hindu College of Benares organized by Mrs. Annie Besant in 1898, was the nucleus of the new institution. Its aim is to promote the study of the Hindu Shastras and of Sanscrit literature generally as well as to advance technical, scientific and professional knowledge, with practical training, to encourage the industries and develop the resources of the country. Large sums were collected from all classes of educated Hindus, with the capitalized value of the recurring grants reaching £675,000. Women will be admitted. The Mohammedans at Hydera have founded a university called Nizamia after the Nizam or prince of that province, to teach the literature and science of Islam. The Mohammedans of Aligarh expect to have a charter

for a university. Similar institutions are desired by the Indians in the Sikh states, in Cochin and Travonare. About the same time as the Mysore University was opened, the Indian Women's University began its work at Poona. Instruction is given in Marathi, with English as second language, and compulsory courses in domestic science. Besides the generous sums given for such colleges, recently large amounts have been donated by Indians to Calcutta University, to the Institute of Science at Bangalore, and elsewhere.

Since 1900 the public outlay for education trebled, amounting to £7,388,000 in 1915–16. In the same period, the number of schools rose from 148,000 to 189,000, and of pupils from 4,500,000 to 7,620,000, the girls showing a large increase. According to the census of India in 1910, 93.8 per cent of the population of British India were illiterate. The ruler of Baroda has made education free and compulsory and his example has been imitated by the Indian rulers of four states, with others to follow in due course. Consult Pandya, T. R., 'A Study of Education in Baroda' (India 1916); Education Supplement, London *Times*, 2 Jan. 1912, 7 March 1915; 'Progress of Education in India,'; *Quinquennial Review* (Calcutta Government Printing Office) 1881–82, et seq.; London *Contemporary Review*, January 1918. INDIA, *Education*.

INDIA, Farther, or Further. See INDO-CHINA.

INDIA, French. See EAST INDIA COMPANIES, and INDIA under *History*.

INDIA, Languages and Literature of. Although it is generally stated that more than a thousand languages are being spoken in India, and that the country is practically a babel of tongues, the principal vehicles of thought are less than 10. The languages now spoken in India are principally the dialects founded upon the corrupt Sanskrit, which is the parent of the Indo-European family of languages, and which has been a dead language for more than 25 centuries. Sanskrit bears the same relation to the Indian languages as Latin to modern European, with, however, certain important modifications. While Latin has furnished the roots and, to a certain extent, the grammar, Sanskrit in India to-day, is considered part and parcel of the spoken languages. Every word in Sanskrit can legitimately be used in any language, and the grammar is exclusive Sanskrit, except in southern India. Tamil, which is the language of southern India, is considered as an independent language spoken by the people whom the Aryans conquered; it has certain peculiarities, and a grammar which differs from the Sanskrit grammar. The conquest of the Aryans has been so complete as to metamorphose even Tamil and make it, for all practical purposes, a dialect of Sanskrit. The origin of the Indian languages must be directly attributed to Prakrit. Even in the time of Alexander the Great, Sanskrit had been superceded by Prakrit, which is the dialect of Sanskrit. This dialect took local color, as it were, in the different places and new languages were evolved. Besides the influence of Sanskrit, the incursion into India of vast foreign hordes left a very marked trace on the languages. Persian and Arabic, which were the languages of the Mohammedan conquerors, brought a large number of words and exercised an influence on literature.

The principal languages spoken in India may be divided into three distinct groups. The northern-Indian languages are the Hindi, spoken by 98,000,000 people; Bengali, spoken by 48,500,000; Punjabi, spoken by 16,000,000; and Rajasthani and Kashmiri, spoken by 10,000,000. Hindi is the language closest to the Prakrit and is spoken by as large a population as that of the United States. It is very rich in poetic literature and is growing in influence. Bengali is the language of Bengal, and next to Hindi has the closest affiliation with Prakrit. Up to a certain time, it was purely a spoken language, but during the last half-century, a great mass of literature has been built up — some of the works being recognized as the peers of the best in the world. The Punjabi, Rajasthani and Kashmari languages are, at present, more or less spoken languages and have yet to develop a literature. Punjabi has a great mixture of Persian and Arabic. Besides these languages, Hindustani or Urdu is spoken throughout northern India. This language is principally Hindi, mixed with Persian and Arabic and was the language of the Mohammedan conquerors — which is still favored by the British government because of its remaining the *lingue Franca*, in spite of the growth of English. The percentage of Persian and Arabic words in Hindustan is less than five, and for purposes of classification, it may be identified with Hindi. The central-Indian languages are the Marathi, spoken by 20,000,000 people; Gujarati, by 11,000,000; and Oriya, spoken by 10,000,000. Although both northern and southern languages are spoken in central India, the above three are distinctive. Marathi has the closest relation to Sanskrit next to Hindi, and Oriya has a great number of aboriginal words and extraneous influences. The southern-Indian languages are the Telegu, spoken by 23,500,000 people; Tamil, spoken by 18,000,000; Kanarese, spoken by 10,500,000 people; and Malayalam, spoken by 6,500,000 people. These four languages form a distinct group, in that, although dominated by Sanskritic influences, they have a non-Sanskritic base. Besides these principal tongues, there are a number of subsidiary languages like the Assamese, Shan, Sindhi and Pushtu, spoken by small bodies of people.

The golden age of Indian literature has, unfortunately been in the past, but all literature was then in Sanskrit. Up to the Renaissance in Europe, Latin was considered the only fit medium for literature; all the spoken languages were considered just mere mediums for ordinary communication. A similar sentiment prevailed in India, and even up to very recent times, Sanskrit was used by the learned to express their thoughts. Just as literature was practically confined to religion and philosophy up to the Renaissance, so Indian literature, up to recent times, has been mainly religious and philosophic. Long anterior to the rise of Buddhism in India, there was a great mass of secular literature. Dramatists like Kalidasa flourished during that period. Later on, the country was degenerating, until it became an easy prey to the Mohammedan conquest.

Beginning with the later years of the Moghuel rule, the Indian vernaculars began to be used as vehicles of thought, principally for religious and devotional purposes. Kabir-Das and Tulsi-Das were the pioneers in northern India, in making the vernacular respected as a literary language. Owing to the internecine strifes and the several wars which raged in the country for 200 years, until India came completely under British rule, there was no room for developments, and for all practical purposes, the hands of the clock were turned back. Only after the consolidation of the British Empire in India, the people began to see the possibilities of the development of the languages of their home. Indian society is so constituted that all attention was paid, and importance attached, to Sanskrit, as the language of their faith. The Brahmins, who have remained for over 30 years the custodians of the faith and literature of India, naturally had a much more than sentimental attachment to Sanskrit. It has been the practice to consider the spoken languages as corruptions and languages of convenience. The other classes of people simply follow in the wake of the Brahmin. Therefore, except on a few occasions, when the vernaculars revolted, as it were, against Sanskrit, no effort at all was made to improve them. The Brahmin, again, was fighting for his supremacy in the country. Any attack on Sanskrit he considered an attack on himself. Without meaning it, he has been the cause of the stagnation in the literary life of India. With the advent of British rule and long anterior to it, the Brahminical class was not purely sacerdotal. It devoted its attention to mundane pursuits and fought with other classes in the country for the amenities of life. Gradually it was devoting less and less attention to the study of Sanskrit. In the early decades of the 19th century, a very large percentage of the Brahmins all over the country were ignorant of Sanskrit. Instead of holding that the use of language of the home and intercourse in business as a vehicle of literary thought was something beneath their dignity, the Brahmins began to take real interest in the vernaculars. It has been the practice in India, that as soon as the Brahminical class takes interest in anything, the other classes are urged to pay attention to it. When a common interest was thus created, the rise and improvement of vernacular literature became just a matter of course.

It is not to be understood that during all the centuries intervening, there was no literature at all in the vernaculars. Sporadic attempts were made to create literatures, although the sum total of the efforts were very few works worthy of note, and most of them religious and devotional. The few that remain became, however, the classics; and the first successful effort was made in Bengal. Bengal was completely ruled by the British, while constant fighting was going on in other parts of the country. Moreover, the impact of Western civilization was greater in Bengal than in other parts of India. The reform movements, social and political, originated in that province, and the vernaculars were more freely used than before. The great reformer, Ram Mohun Roy, who was the founder of the new cult known as the Brahmo-Samaj, used the Bengali to disseminate his doctrines.

An event of great importance in the history of literature in India was the passing of the Education Act. When Lord Macaulay was fighting for the introduction of the English language, as a medium of education in the country, he did not for a moment imagine that the result would be what has happened to-day. H. H. Wilson, the great Sanskrit scholar, was all for Sanskrit as the medium of education; and his argument was sound in that he believed that such a step would be in accordance with tradition. The British government was, however, concerned with the supply of sufficient clerical aid to carry on the work of administration, and decided in favor of Lord Macaulay's proposal. For a time, the people of India, in their eagerness to assimilate the new knowledge, paid little or no attention to either Sanskrit or the vernaculars. When, however, education was advanced sufficiently to make the new scholars judges of the relative merits of English literature and their own ancient literatures, they found that they had been extraordinarily foolish in neglecting what they were entitled to call their own. The complete subjection and the improvement in the facilities of communication brought the different peoples in close touch with each other and made them feel that they had a common heritage which they were selling for a mess of pottage. A new nationalistic spirit began to prevail in the country and efforts were directed toward finding expression for such spirit. Sanskrit was unknown to a great mass of the people, and English was only known to a very small minority. Therefore, the only medium for expression, which could be at all effective, was rightly considered to be the vernaculars. The regeneration of the country had to be effected by the dissemination of as much of Western thought as possible. The leaders also found that they must work on the new lines, if there was to be any salvation for the country. The result was a flood of literature in the different vernacular languages, and credit should be given to Bengal for initiating the movement. The men and women, who were in the front of the movement, had a genuine English scholarship, and hence were able to give the people something which was novel. The chief writers of Bengal were Iswara Chandra Vidyasagar, Madhusudan Dutt and Bankim Chandra Chatterjee. Vidyasagar was the father of Bengali prose. Previous to his advent, there were no prose works of any length or merit in the whole of that province. He was a great reformer and flooded the country with literature of the rarest kind, which had an electrifying effect on the population. Few thought that the language could possess such prose works. Dutt was as unfortunate in life as Edgar Allen Poe, and his career was a romance of misery. He studied for the bar in England and had published some poems. They were considered by English critics as considerably above the average. Having been converted to Christianity when he was a youth, he was shunned by both the Hindoo and European communities. After a long period of domestic and financial unhappiness, he turned back to his old faith as a solace and began to write poems in his native tongue. When they appeared in print, Bengal was loathe to ascribe them to any modern writer and thought that it was the work of a genius or of an ancient sage. It is the irony of Fate that Madhusudan, the Christian, should

nave given the first rendition of Ramayana, in his native tongue. His work is a classic, and will remain a classic. Chatterjee was a government official and a sincere patriot. The two cannot go together in a country like India. He was fired by the enthusiasm of a visionary and was anxious to do something great. He wrote the first novels in the Bengali language, and he took for his guide Sir Walter Scott. He made the episodes of the fights for freedom, which his people waged against the inrushing hordes of Mohammedans, live. His descriptions and characterizations are almost unique, and such European writers as have studied his works in the original are unstinting in their praise. It is a curious fact, that a battle hymn from his "Durgesanandini," called "Bande Mataram," meaning, "Hail Motherland" has become the national song of India to-day. Thousands of men and women have been prosecuted and sentenced by the government, during the past few years, for jnst crying, "Bande Mataram." After these pioncers, followed a host of young writers who have distinguished themselves in many ways; but latterly the political ferment in the country has led to greater attention being paid to newspaper work, rather than good literature. The two most famous writers of recent periods are, Romesh Chunder Dutt and Rabindranath Tagore. Dutt was a member of the Indian Civil Service, who occupied the highest position available for an Indian, under the British government. His work was mainly political, but his writings are considered good literature. Rabindranath Tagore has had international fame on account of his being awarded the Nobel Prize for literature in 1913.

There have been numerous writers in Hindi, Punjabhi, Gujarati and Marathi among northern Indian languages; but few have had an international reputation, with the exception of the late Behramji Malabari and Bal Gangadhar Tilak. Mr. Tilak has been more in the limelight as a politician, and will be remembered by his people as a master of Marathi prose. The activity, however, in these languages has been not even a small fraction of that in Bengali, and for various reasons has been frittered away in journalism. The vernacular journalism in Bombay is much more powerful and more modern than similar journalism in other parts of India.

The most interesting of the Indian languages is Tamil, which is the language of the southern half of Madras. It is closely affiliated with the three other languages spoken in the presidency, and being the language of the provincial metropolis is more influential than the rest. This language claims to be nearly as old as Sanskrit. It has a distinctive grammar, an alphabet which is found in no other language in the world, and a tradition which is older than that of any other modern Indian language. There is no doubt that the original Tamils were the inhabitants of the country, prior to the conquest by the Aryans. To-day, in spite of the fact of 25 centuries of intermingling, we find traces of people who are as distinct from the Aryans, as the negroes are from the white Americans. Culture and literature, however, is not in the hands of the original inhabitants. The language has, as it were, been taken up by the Aryans and remodeled. Although there are works which are undeniably known to be 15 to 16 centuries old, we have as yet no trace of Tamil literature without the influence and admixture of Sanskrit. The earliest works show Buddhistic influence. Evidently, Buddhism lasted longer in the south, than in the north, before it was driven out or incorporated into Brahminism. A fairly large number of classics of an early era is available in this language. Kural, Manimehalai and Silappathiharam are said to have existed anterior to the 8th century. Kambaramayanam, Naladiyar and Bharatam are at least 400 years old. Southern India was disturbed by the Mohammedan invasion only late in the day; and even after the Mohammedans came down south, life and literature were less molested than in the north. Since the British admistration, the same influences that have led to a Renaissance in Bengal, have also exerted a powerful influence in connection with Tamil. A number of young writers have produced works which can compare favorably with those of Europe and America.

A treatment of Indian literature will be very incomplete if sufficient attention is not paid to the press. The vernacular press in India is growing powerful every day, and as a rule contains much that is usually published in book form in Europe and the United States. The reason is obvious. The people, as a whole, are too poor to spend a great deal on books, and there is no regular market for literature, especially as the government places every obstacle in the path of the development of indigenous thought and writing. The papers published in the native languages in India are watched very carefully, and are the only means of support for those who choose a literary career. Therefore, they are on a much higher plane than the greater part of newspapers in any part of the world. There is, again, the satisfaction of making innovations and many of the subjects that are daily being discussed have never been treated in any manner in the past. These papers have a much wider circulation than their subscription lists disclose. Owing to the extraordinary apathy of the authorities in educating the people, and the very low percentage of literate people, the newspapers are usually read to the people. In a village, for instance, about 20 or 30 people will club together to buy a number of papers, and pay one man to read it to them. Just as people discuss affairs in the clubs of Europe and the United States, world politics is read and discussed in the village temple or the grove. In 1912, Bombay had 359 papers; Madras and the nearby states 256; Bengal, 258; the United Provinces, 223; and Punjab, 211,—all told 1,447 papers and magazines in the country. It is certainly a ridiculously low number for the extent of the country, but considering that it is an innovation, and that the vernacular press is fettered with all sorts of restrictions by the government, and the writers live in constant dread of being marched to jail any moment, it is indeed a matter for surprise, that so many should exist at all. Consult Grierson, 'Linguistic Survey of India' (Calcutta 1903 et seq.); Schmidt, P., 'Grundzüge einer Lautlehre der Mon-Khmer Sprachen' (Vienna 1906).

SRINIVAS R. WAGEL.

INDIA, Music of. Music was a science in India long before it was considered so in other

countries and the Hindu Scriptures are the first in recorded history to mention music as a science. The Rig Veda mentions musical instruments like the drum, the lute and the flute. The Sama Veda, as it was chanted in those ancient days, and as it is chanted even to-day, most conclusively proves that the science of vocal music was developed to a considerable extent. In ancient India the function of music was to assist in the performance of religious ceremonies. Even to-day most of the daily devotional duties of the Hindu are performed in chant or in rhythmical movements of the body. Strabo admits that the greater part of the science of Greek music owes its origin to India. The system of notation, which was perfected in India before 350 B.C., "passed through the Persians to Arabia and was from there introduced into European music by Guido d'Arrezzo at the beginning of the 11th century," states Montstuart Elphinstone, the English historian of India.

Hindu music is divided into seven chapters as follows: (1) Sur-Adhya treats of tones, semi-tones, etc.; (2) Rag-Adhya treats of tunes and melodies; (3) Taal-Adhya treats of time; (4) Ast-Adhya treats of musical instruments; (5) Nirt-Adhya treats of dancing; (6) Bhao-Adhya treats of actions and movements in rhythm with singing and dancing, and (7) Arth-Adhya treats of comprehension of tunes and times.

The scale of Hindu music has seven notes, just like Western music. They are Sa (shudja) which corresponds to the European note C; Ri (Rishaba) to D; Ga (Gandhara) to E; Ma (Madhyama) to F; Pa (Panchama) to G; Dha (Dhaivata) to A, and Ni (Nishada) to B. Each of these notes is considered to be presided over by a deity of the Hindu pantheon: Agni (god of fire), presides over Sa; Brahma (god of creation), over Ri; Saraswati (goddess of learning), over Ga; Mahadeva over Ma; Vishnu over Pa; Ganesh over Dha, and Surya over Ni.

Instead of the 12 tones and semi-tones of the European scale, the octave of Hindu music is divided into 22 quarter tones and thirds of a tone. That is the main reason why unaccustomed Western ears cannot, at first, appreciate Hindu music. It is so delicate that it does not sound like music at all; it sounds rather like a jumble of notes without the least æsthetic significance. "But," says a European critic, "the Hindu music has attained a theoretical precision yet unknown to Europe."

From the scale of 22 notes and quarter-notes the Hindu divides certain groups into Ragas. There are six Ragas, one for each season of the year. Sri Raga is for the winter, Vasanta for the spring, Bhairava for the summer, Megh for the rainy season, and Natanarayan for late autumn. The six Ragas are male, and there are 36 Raginis.

The Hindu masters of music have set aside different Ragas for different hours of the day. And it is improper to sing a song that is not suited to that hour of the day. As for example, Bhairava is sung from 4 A.M. to 8 A.M.; Megh from 12 noon to 4 P.M.; Dipak from 8 P.M. to midnight.

Again, the atmospheric conditions also go to decide on the Raga to be sung. When it rains the Hindu sings the Megh-Makar, and it makes you feel wet and hear the gentle raindrops fall. Near a fire or in an exceedingly hot hour of the day he would sing Dipak, a Raga that would make you feel a kind of burning sensation. According to Prof. Inayat Khan there are 400 main ryhthms in Hindu music.

Before singing the song itself the Hindu musician sings Alap. Alap is a kind of prelude to the song. There are no words to an Alap. It simply prepares the ground and creates an atmosphere for the ensuing song. Then, when the singer begins to sing, he is free to improvise as he wishes. He must, of course, conform to the general rule of the Raga, but he improvises according to the mood and the environment he is in, and the audience he is singing for. The master musician does not care much for the words of the song. He often sings one line, and then improvises it in a hundred different ways by repeating the same line a hundred different times. "Music," says Rabindranath Tagore, the Hindu poet and musician, "is not dependent on words. It is majestically grand in its own glory. . . . What words fail to convey to human mind, music does with perfect ease. Music begins when words end." This is certainly the spirit of Hindu music.

Unlike the music of the West, Hindu music is purely melodic. And yet the use of such words as Vadi (principal note), Samavadi (note subordinate to it) and Vivadi (discordant) in the Vedas plainly show that at least some of the rudimentary rules of harmony were understood by the musicians of the Vedic age. But it must be admitted, however, that Hindu music is essentially melodic. In other words, it is produced by successive sounding of single tones of different pitch, whereas the Western harmonic music is produced by the simultaneous sounding of single tones of different pitch. The melodic nature of Hindu music helps to lend itself easily to improvisation.

There are a thousand and one different kinds of musical instruments in India. For full particulars of which the reader should refer to the works of Raja Sourindra Mohon Tagore, and for a fuller account of Hindu music the reader must consult 'The Music of Hindusthan' by H. H. Fox-Strangways and 'The Introduction to the Study of Indian Music' by E. Clements.

INDIA, Native States of. See INDIA under *Political Divisions, Local Government* and *History.*

INDIA, Portuguese. See EAST INDIA COMPANIES, and INDIA under *History.*

INDIA INK, a black pigment, consisting commonly of lampblack, gelatine and water. The usual basis of India ink is a finely divided solid carbon, mixed with a size to hold it in suspension when the ink is prepared for use by mixing it with water, the depth of the shade being regulated by the quantity of water used in the mixing. This ink was originally made in China and Japan, where the ink is applied with a brush both for writing and drawing. In Europe and America it is now used chiefly for black-and-white drawings.

INDIA RUBBER, a colloidal substance obtained from the milky juice of several widely different plants, and otherwise known as

caoutchouc or gum-elastic. The most important sources are: *Hevea Braziliensis* and *Castilloa elastica*, two trees native to South America but cultivated in many other sections; *Manihot Glaziovii*, *Ficus elastica*, several vines of genus *Landolphia*, and the Mexican guayule plant, *Parthenium argentatum*. Some of the properties of india rubber must have been known to the natives of America at a very early period, because balls made by the Haytians of the gum of a tree, bouncing better than the wind-balls of Castile, are mentioned by Herrera in his account of Columbus' second voyage. In a book published in 1615, Juan de Torquemada mentions the tree which yields it in Mexico, describes the mode of collecting the gum and states that it is made into shoes; also that the Spaniards use it for waxing their canvas cloaks to make them resist water. More exact information was furnished by M. de la Condamine in 1735. India rubber was at first known as Elastic Gum, and received its present name from the discovery (about 1770) of its use for rubbing out black-lead pencil marks, for which purpose it began to be imported into Britain in small quantities about the end of the 18th century. Its application to the manufacture of waterproof cloth first gave it commercial importance. About the same time a method was discovered of fabricating articles of various kinds by casting india rubber in molds. Until very recent years the india rubber of commerce was obtained chiefly from South America, but the larger part of the present market supply comes from the cultivated rubber plantations of British India and the Indian Archipelago, and a considerable and increasing quantity from the west coast of Africa and the Mauritius.

The sap as gathered from the rubber-yielding plants holds in suspension the globules of rubber, each being surrounded by a protective envelope of a proteid substance. In order to secure the coalescence, of these globules, various methods are employed in different localities and with different rubbers. The most common process is by exposing thin layers of sap to the heat and smoke of an open fire, but a method of chemical coagulation is employed in some localities following a condensation by a centrifugal treatment of the fresh sap. As it reaches the market, crude rubber is a very uncertain substance, containing from 15 to 50 per cent of impurities, much of which is simply dirt, as sand, bits of wood and clothing, leaves, plant fibres, etc. Other impurities which are normal to the sap are resins, sugars of several kinds, albumen, essential oils and a percentage of water, often very considerable. On some plantations of cultivated rubber the gum is carefully cleaned and washed before it is marketed, but generally the manufacturer's first operation is to wash the crude material. The lumps of raw rubber are first steeped in warm water until soft and then sliced into thin sections under water and run between deeply corrugated rolls, also under water until they are in thin wavy sheets resembling crepe. They are then dried in the air or in a vacuum chamber, being carefully protected from light which has a tendency to set up injurious chemical changes, especially oxidation. By the vacuum process the drying is completed in an hour and a half; by the air-drying method several days are required. As rubber is hygroscopic, the drying operation is one demanding skilled attention, for the vulcanizing of the rubber depends very largely upon the content of moisture.

Pure india rubber has the composition $C_{10}H_{16}$. It is insoluble in water, in the esters, and in the ethers — all of which, however, are readily absorbed by rubber, causing it to swell. The solvents used in the arts are turpentine, dipentine, petroleum spirit, carbon disulphide, benzene and chloroform. The solvent most frequently used is petroleum spirit, on account of its cheapness. As a matter of fact the usual phenomena of solution are not observed with rubber. The gum absorbs the solvent, becoming first a jelly, later assumes a viscous condition, and as more of the solvent is added it finally takes a freely liquid form. India rubber is highly distensible, and this property increases with the increase of temperature. If the degree of heat is carried to 200° F., the distension becomes permanent. Pure rubber is used to but a limited extent in the arts, but for all general purposes it is first vulcanized. Two grades of vulcanized rubber are prepared, one hard and horny in its texture, the other soft and elastic. In the case of the former the caoutchouc is mixed with about one third of its weight of sulphur and heated for several hours, the temperature finally rising to fully 300° F. For the soft kind of vulcanized rubber, on the other hand, a much smaller proportion of sulphur is required — viz., from 2½ to 10 per cent, and the heat to which it is subjected in the vulcanizing chamber is considerably less. Usually, too, with this latter kind, the articles are made before the rubber is heated. The sulphur is commonly added in the ground state, but sometimes the rubber is treated with some solution containing this element, such as the bisulphide of carbon.

Hard vulcanized rubber, termed vulcanite, and sometimes ebonite, is made into a great many small articles, such as combs, chains, bracelets, boxes, penholders, paper-knives, knife-handles, buttons, etc., as a substitute for materials like horn, bone, ivory and jet. Like these substances themselves, it is formed into various objects by molding, cutting, carving, polishing and other processes. Vast numbers of these articles are now sold. The black color of vulcanite ornaments has still a tendency to turn gray, but the brittleness which was a fault of combs made of it a few years ago has been overcome.

Manufactures from india rubber turned out from the factories of the United States in 1914 amounted to a value of $300,994,000. Of this total a value of $53,822,000 was in the form of boots and shoes. So great is the demand for india rubber, for use in manufacturing, that not only has the importation grown from 2,000,000 pounds in 1862 to over 200,000,000 pounds annually at the present period, but in addition to this the forests of the East Indies are called upon for several million pounds annually of a substitute for gutta-percha, known as "gutta-joolatong," while at the same time the highways and byways of Europe and other countries are ransacked for cast-off rubber manufactures from which the rubber is "reclaimed" and re-used in conjunction with the new rubber from the forests of Brazil, Africa and the East Indies.

The industry of importing and "reclaiming" india rubber for re-use in manufacturing is a

comparatively new one, and while it utilizes large quantities of worn-out rubber boots and shoes and other articles of this character from the scrap heaps of the United States, it has only taken in other parts of the world in recent years.

Importation.— The effect of the Great War in Europe on the rubber importations of the United States has been remarkable. In 1913, the last year in which the figures can be considered as normal, the quantity of rubber imported was 113,384,359 pounds, valued at $90,170,316. In the fiscal year ended 30 June 1916, the importation was 267,775,557 pounds, valued at $155,044,790. Of the great total, 125,532,067 pounds came direct from the East Indies; 72,459,408 pounds from England — part of this being East Indian and Part South American production; 54,968,227 pounds from Brazil and 6,265,387 pounds from Peru and other South American countries; and 4,599,042 pounds from Mexico and Central America. In addition, the United States imported in the fiscal year 1914–15, 3,188,449 pounds of gutta-percha (1,204,406 pounds in 1913), nearly all from Straits Settlements; in 27,858,335 pounds of gutta-joolatong (45,345,338 pounds in 1913), of which 90 per cent came from Straits Settlements; 2,816,068 pounds of guayule rubber from Mexico (10,218,191 pounds in 1913); and 16,371,573 pounds of scrap or refuse for remanufacture (43,385,456 pounds in 1913), principally from Canada and England.

See also CAOUTCHOUC; RUBBER MANUFACTURES, AMERICAN; RUBBER TREES.

Consult Brown, H., 'Rubber: Its Source, Cultivation and Preparation' (London 1914); Pearson, H. C., 'Rubber Machinery' (New York 1915); Potts, H. E., 'The Chemistry of the Rubber Industry' (London 1912); Schidrowitz, P., 'Rubber' (London 1911); Seeligman, T. (and others), 'India Rubber and Gutta Percha' (London 1910); 'Reports of the Fourth Rubber Congress' (London 1914).

RICHARD FERRIS.

INDIA RUBBER TREE, the name generally given to the *Hevea Brasiliensis,* the rubber tree par excellence. It is indigenous to the region of the River Amazon and in the tributary areas of Peru, Bolivia, Ecuador, Colombia and Venezuela. The tree has been recently planted with great success, especially in Ceylon and Malaya. It is a large tree, of slow growth and long life. It has been found 12 feet in circumference. It requires low-lying, rich, deep soil and abundant moisture. It grows wild in Brazil over an area estimated at 1,000,000 square miles; there, however, it does not grow in clumps, being found rather scattered through the tropical forest, but it is well adapted to cultivation as has been demonstrated within recent years in the East Indian Islands. There are several other trees which produce rubber, including the Manihot, which produces the Ceará rubber of commerce, but its habitat is a high, stony and arid country. This is also a native of Brazil, but of the region south of the Amazon. Castilloa, next to Hevea, the best known rubber producer, has its principal range in Central America and southern Mexico. Other trees which furnish rubber are the Hancornia speciosa, which produces the Mangabeira rubber of Brazil and species of Sapium, also the *Ficus elastica* of Assam, the *Funtumia elastica* of Africa and vines of the genera *Landolphia, Clitandra, Carpodinus* and the guayule plant (*Parthenum argentatum*).

INDIAN. See INDIANS, AMERICAN.

INDIAN AFFAIRS. In former years an idea was prevalent that the national government had always striven to dispossess the Indians from the lands they occupied, or had sympathized with such efforts. This was the exact reverse of the truth. From its foundation until now history presents an unbroken record of quarrels between Indians and bordering or interdwelling white settlers, in which the government has been slowly and reluctantly pushed on to interfere; sympathizing with and justifying the Indians against its own citizens, its commissioners usually reporting in their favor and even its generals in later days blaming the whites for the troubles; its courts deciding in their favor; attempting pacification amid local outcries against them, rebuffing appeals for aid and only using its armies to reduce the Indians and its administrative power to remove them when it was no longer politically possible to leave them in possession. Even then, it has meant to deal righteously by them; but the complexity of the problem — one may say its insolubility till the country was very strong and the Indians very weak — along with the universal curse of "spoils" in the administration — hindered success. Until 1887, there was no consistently formulated plan, but there has followed a sequence of government panaceas in a steadily descending line. First, there was to be one vast Indian reservation, large enough to give them all the hunting-room they needed and so far from the United States that our growth would never reach to them and create more troubles; then three great reservations, to prevent so formidable an Indian district and internecine Indian wars; then a number of small ones, to segregate hopelessly hostile tribes, enable better training for civilized existence, and protect them from depredations; lastly, no reservations, but severalty ownership and individual citizenship. These changes of policy have been due not to fickleness or visionary causes, but to broadening experience and varying conditions.

The policy of removing the Indians west of the Mississippi was first formulated by Jefferson, who in a proposed constitutional amendment (1803) set off the Louisiana Purchase north of the Arkansas as a pure Indian country, in which no land was to be sold to whites. This was carried out, on a much reduced scale, in the formation of Indian Territory (q.v.) by act of 30 June 1834; by another act of same date a superintendent of Indian affairs was appointed; no one to trade or settle in the Indian country without permission from him or his agents. Previous to this the Indian matters had been under the War Department; in 1849 they were transferred to the new Department of the Interior, of which they still form a bureau. Under the Commissioner of Indian Affairs are eight inspectors and a large variety of subordinate officials and employees. The Indian agents, though under his control, are appointed by the President for four years, with bonds; on their action depends often peace or war to great white populations, but in too many cases form-

erly they were the football of politics and sometimes scandalously unfit for their places.

The legal theory, for some time, was that each tribe was a nation, but not a foreign nor independent one; a "domestic dependent nation," but with which, nevertheless, all intercourse was to be conducted through special commissioners appointed by the President. In 1871 Congress abolished this method of procedure, and substituted immediate Congressional control, but the fiction of Indian nations remained; nor, indeed, could any other system well be applied so long as the Indians were recognized as national wards, and could not be made a part of the regular republican system or thrown into the current of unrestricted competition. It was the general plan to let the larger and better advanced ones, the Cherokee, Chickasaw, Choctaw, Creeks and Seminoles (qq.v.), the five "nations" of the Indian Territory, govern themselves and thus develop political life, including a full judiciary system. But the smaller ones could not be thus left, even in leading-strings; and in all, the government has recognized its duty to watch over their ignorance, improvidence and savage instability of will and emotion from either violence or cunning on the part of the whites. Traders with them must have certificates of good character and be licensed by the Indian commissioner, and the goods they sell are subject to regulation; no one can hunt, cut timber or pasture cattle on Indian lands without the agent's permission; intoxicating liquors may not be sold to them. Still more important and beneficial is the educational work, which has not only been carried on by churches, missionary societies and private individuals from early times, but has been actively forwarded by the government. The five civilized nations of Indian Territory had their own school system, of considerable extent; but for others, and even for those where needed, the President was empowered in 1865 to appoint instructors of Indian children in reading, writing, arithmetic and agriculture, and in 1882 to appoint an inspector of Indian schools. See INDIAN, EDUCATION OF THE.

From 1877, when a $20,000 appropriation was made for Indian schooling, to 1900, when over $3,000,000 was appropriated, over $35,000,000 had been thus expended by the government. It had spent since its foundation nearly $400,000,000 on the Indians, outside of the cost of wars against them; and the present expenditure is about $10,000,000 a year.

On 8 Feb. 1887 an act was passed, amended in 1890, to sweep away as soon as feasible, the system of tutelage and pauperization, in the belief that abolition was best for Indians and whites alike. All reservations were to be surveyed; all Indians who wished to take up lands in severalty to a certain amount might do so — and by the act become citizens, as well as all who had previously done so under treaties and Congressional enactments, over 10,000 in number. About 2,000 a year comply with the permission and many of these new citizens are made voters by their States; in 1915 there were over 24,000 such in the United States.

The total Indian population of the United States, exclusive of Alaska, on 30 June 1915 was 333,010. Exclusive of the five civilized tribes, including freedmen and intermarried whites (101,521), the number was 231,489 distributed as follows:

INDIAN POPULATION BY STATES AND TERRITORIES

Alabama	909	Idaho	4,200
Arizona	42,336	Illinois	188
Arkansas	460	Indiana	279
California	15,034	Iowa	364
Colorado	890	Kansas	1,375
Connecticut	152	Kentucky	234
Delaware	5	Louisiana	780
Dist. of Columbia	68	Maine	892
Florida	578	Maryland	55
Georgia	95	Massachusetts	688
Michigan	7,514	Oklahoma	[1] 118,358
Minnesota	11,723	Oregon	6,481
Mississippi	1,253	Rhode Island	284
Missouri	313	South Carolina	331
Montana	11,329	South Dakota	21,082
Nebraska	3,917	Tennessee	216
Nevada	7,819	Texas	702
New Hampshire	34	Utah	3,210
New Jersey	168	Vermont	26
New Mexico	22,007	Virginia	539
New York	6,185	Washington	11,423
North Carolina	8,047	West Virginia	36
North Dakota	8,710	Wisconsin	9,889
Ohio	127	Wyoming	1,705

[1] Exclusive of Five Civilized Tribes in Oklahoma and scattered Indians under Government jurisdiction, except where indicated.

The total area of Indian lands amounts to 68,102,691 acres in 224,713 allotments of which 34,768,430 acres are allotted, 33,334,261 are unallotted and 7,470 allotments comprising 1,077,257 acres, are public domain. The total annual income of 309,911 of the Indian population on reservations for the fiscal year ending 30 June 1915 was $23,193,046, comprising $4,790,968 of crops raised by Indians, $2,114,623 of stock sold, $1,177,000 worth of weaving, basketry, etc., manufactured by 27,297 Indians, $1,446,021 of cut timber, $2,304,339 worth of wages earned, $499,585 of rations and miscellaneous issues, $2,975,526 from leases, $3,571,855 from sales of lands, $2,125,787 interest on trust fund, $630,560 treaty and agreement obligations and $1,556,182 of Indian moneys, proceeds of labor and miscellaneous.

The progressive tendency of the present day has been reflected in the vigorous activity of the Indian Service branch of the Department of the Interior dealing, as it does, with the intricate complexities involved in the lives of over 333,000 members of the race, both as to the individual and to every phase of their social and industrial functions. Thoroughly convinced that their material and industrial prosperity is more closely attached to their landed interests, the development of agriculture and stock raising has been given an impetus never before undertaken. Not only their own moneys but reimbursable funds made available from appropriations by Congress have been invested in thousands of cattle and other live stock. The Indians are being taught how to make the best use of this wonderful asset and rapidly are realizing that from the farm and the range their material salvation must be obtained. A happy correlation of the instruction given in the schools is being made with the future environment of the boy and girl. The mere acquisition of knowledge is subordinated to the practical teaching of facts and laws which bear directly on everyday life on the farm and in the home. Poverty or dependence on others saps the energies of any individual. The Indian is no exception and the greatest work of the Indian Service is placed on his material advancement. As his herds increase and his lands produce, the

Indian becomes better prepared to assimilate the knowledge which comes from the study of books. Love of home and domestic happiness follow as a natural consequence. In 1916, according to the report of the Commissioner of Indian Affairs, the birth rate among the Indians exceeded the death rate for the first time in half a century. The prime factors in bringing about this result are up-to-date hygiene and sanitation, modern methods of combating preventable diseases and the disappearance of the "medicine man." Better habitations are now provided and the infants of the race are safeguarded from birth according to the principles of modern science; hospitals of modern type are provided, displacing the medicine man and his incantations. In consequence of what is being done in educating the Indian to the importance of modern sanitation, tuberculosis, trachoma and other preventable diseases that formerly ravaged the tribes, are fast disappearing. In academic and vocational schools, equal to those of the most progressive white communities, the Indians are being taught the usual school subjects, the common trades, the principles of the government under which they live, good manners, proper living and the niceties of refined society. Consult Sells, C., '84th Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior' (Washington 1915). See also CHEROKEE; CHICKASAW; CHOCTAW; CREEKS; SEMINOLE INDIANS; INDIANS, AMERICAN; INDIAN RESERVATIONS.

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INDIAN ASBURY UNIVERSITY. See DE PAUW UNIVERSITY.

INDIAN BEAN, a catalpa (q.v.); specifically the large southern tree (*Catalpa catalpa*), now planted as a shade or ornamental tree all over the country on account of the beauty of its masses of spring flowers and the quaint appearances in autumn of its long, bean-pod-like fruit.

INDIAN BIBLE, the first Indian translation of the Bible in the New England colonies. This translation was made in 1663 by John Eliot, "The Apostle to the North American Indians." It was in the dialect of the Naticks, a Massachusetts tribe of the Algonquins. A second revised and corrected edition was printed in 1685, only 12 copies of which are known to exist. An edition with notes by P. S. Du Poneau, and an introduction by J. Pickering, was published in Boston in 1822. When the original edition was issued, 20 copies were ordered to be sent to England. A copy of the edition of 1663, with the Epistle Dedicatory, was sold in 1882 for $2,900.

INDIAN BREAD-ROOT, a plant of the genus *Psoralea*; the "large" was *P. esculenta*; the "small" *P. hypogæa*. See BREAD-ROOT.

INDIAN CORN. See CORN, INDIAN.

INDIAN DAY. Indian Day was observed for the first time in the United States in 1916. It is a recognition of the Indian race and intended to be of benefit to them in numerous ways. The census of June 1915, showed that there were 333,010 Indians in the United States. Only seven States have an Indian population of 10,000 or over. They are Arizona, California, Minnesota, Montana, Oklahoma, South Dakota and Washington. Oklahoma leads with 118,358. The expenditures of the United States on account of the Indians in the fiscal year ended 30 June, 1915, were $20,592,322.48. The government spent over $4,500,000 alone for the maintenance of Indian schools. Records show that 85 per cent of the total number of gainfully employed Indians are in seven occupation groups. The groups consist of agricultural laborers, farmers, stock raisers, lumbermen, raftsmen, woodchoppers, laborers in manufacturing and transportation, basket makers,

weavers, launderers and laundresses, servants and waiters.

INDIAN FIG. See PRICKLY PEAR.

INDIAN FIRE. See BENGAL LIGHT.

INDIAN FOLK TALES AND MYTHS. See FOLK TALES AND MYTHS OF THE AMERICAN INDIAN.

INDIAN HEAD, Canada, town in Saskatchewan, 40 miles east of Regina, on the Canadian Pacific Railroad. It has extensive grain-growing interests and numbers among its industrial establishments planing mills and lumber yards. The Dominion government maintains here an agricultural experiment station and a forestry school. Pop. 1,285.

INDIAN HEAD, (1) New Jersey, the highest point of the Palisades, 550 feet; so called because it resembles somewhat the head of an Indian. It is in Bergen County, on the Hudson River opposite Hastings, N. Y. (2) The name of a village in Fayette County, Pa. (3) A small town in Maryland, on the Potomac River, below Washington, the seat of a naval station.

INDIAN HEMP. Sometimes called Canada hemp. See APOCYANACEÆ.

INDIAN HIPPO, an American plant. See BOWMAN'S ROOT.

INDIAN HUMPED CATTLE, a species of East Indian oxen (*Bos indicus*), now known only in the domesticated state, distinguished by a high fatty hump on the withers, by the prevalent ashy gray color, large drooping ears, enormous dewlap and several structural peculiarities. They vary in size from those as large as a European ox to the smallness of a half-grown calf. They are the working cattle and draft animals all over India and eastward, more or less locally, to China. They are venerated by the more pious sects of Hindus, especially certain privileged bulls, called Brahma or Brahminy bulls, which wander about the bazaars of cities unharmed and unchecked in their depredations upon market produce.

Humped cattle are known in Madagascar and in Abyssinia, and it has been suggested that the species were originally African. The Abyssinian form is a large animal with huge horns called "galla ox" or sunga. These animals seem to thrive only in hot countries.

INDIAN MADDER. See CHAY-ROOT.

INDIAN MUSIC. Every public ceremony and every important act in an Indian's life was accompanied by song. For each ceremony there existed a special class or type of song and songs for individual celebrations were similarly classified. An Indian can determine at once the class of a strange song by the rhythm of the music. In structure, the Indian song follows the outline of the form which obtains in our own music—a short melodic phrase built on related tones which are denominate chord lines, repeated with more or less variation, grouped into clauses and correlated into periods. The compass of songs varies from one to three octaves. Some songs have no words, vocables being used instead and when once set to a melody they are never changed. Plural singing is generally in unison, on the plains and elsewhere, the women using a high, reedy falsetto tone an octave above the male singers. Men and women having clear resonant voices and good musical intonation compose the choirs which lead the singing in ceremonies. Songs are the property of tribes, societies and individuals. Societies are most careful not to change a word of a song. Indian songs show the development of music, and as such, a study of them is of great historic value. Moreover, they offer to the composer a wealth of melodic and rhythmic movements, and that peculiar inspiration which heretofore has been attained solely from the folk songs of Europe.

Drums vary in size and structure and certain ceremonies in some cases evolved a peculiar type. Whistles of bone, wood or pottery are employed in some ceremonies. Pipes are of recent introduction but are now favorites. The flageolet is widely distributed and is played by young men during courtship, it also accompanies the songs of certain ceremonies. Rattles were universal and of many types. Consult Baker, 'Ueber die Musik des Nordamerikanischen Wilden' (1882); Cringan, 'Iroquois Folk-Songs' (Toronto 1902); Burton, F. R., 'American Primitive Music' (New York 1909); Tiersot, T., 'La musique chez les peuples indigènes de l'Amérique du Nord' (Paris 1910).

INDIAN MUTINY. The British occupation of India had been largely aided by native troops called Sepoys, who were enrolled under British officers in the service of the East India Company. At the close of Lord Dalhousie's sway in 1856, when the whole of India seemed to have been either reduced directly under British rule, or if retaining its native princes to have placed itself under British protection, the Sepoy mutiny, a contingency for which the government ought not to have been altogether unprepared, occurred. Previous symptoms of disaffection had not been wanting. Mutiny had on several occasions broken out in the native army, in a way to indicate how easily, through causes which Europeans, from their defective sympathy with native thought and feeling, could not anticipate these troops might be alienated; but, on the other hand, the general fidelity of the Sepoys merited confidence, and this feeling prevailed over any grounds of suspicion which might have been formed from isolated occurrences. The Sepoys in Bengal were mostly either Mohammedans, or Hindus of the Brahmanical or military castes. The recent annexations had alarmed the native chiefs, while the fanatical Hindus had been deeply offended by reforms, including the successive abolition of various rites of their worship. Two European regiments had been drafted off for the Crimean War, and had not been replaced. Others had been sent to Burma, and in the beginning of 1857 fresh regiments were despatched to Persia, so that only eighteen regiments were left in all Northern India, of which nine were in the Punjab. In Oudh, where, from its recent annexation, disaffection was rife, there was only one British regiment, and Delhi and Allahabad, the two chief arsenals, were guarded by native troops. To add to these favorable circumstances a Hindu devotee had prophesied the termination of British rule at 100 years after the battle of Plassey. A slight incident sufficed

to give point and direction to a spirit of disaffection which so many circumstances tended to favor. At this time the Enfield rifle was introduced into the Bengal army. This rifle was loaded with a greased cartridge, the end of which required to be bitten off at the time of loading. By a natural inadvertence the authorities had neglected to consider how this seemingly trifling requirement might affect the easily excited sensitiveness of the Hindus in regard to caste, and this insignificant circumstance removed the last security against a united movement of disloyalty among the native troops, by establishing a bond of sympathy between the Mohammedans and Hindus. A report got abroad that the cartridges were to be soaked in cow and pork fat. The prejudices of Hindus and Mohammendans were thus equally involved, and as this rumor rapidly spread, the excited imagination of the Sepoys conceived a conspiracy on the part of the government to convert them forcibly to Christianity, by compelling them to violate the laws of their own religion. When this grievance was explained it was at once removed, the manufacture of greased cartridges at Dumdum was stopped, and the men were instructed to grease them themselves with materials produced at the bazaars. Suspicion once aroused, however, was not to be allayed, and easily found a new object of contention. The paper of the new cartridges was glazed, and it was again alleged that grease was used in its manufacture. The spirit of disaffection became too deep-rooted for any measures of conciliation. Conferences among the disaffected gave rise to ambitious schemes and the original grievances became a pretext in the hands of unscrupulous leaders, whose excesses debarred them even from the plea of patriotism, to extirpate the British power in India. On 26 February the first overt act of mutiny took place at Berhampur, when a regiment refused to receive their cartridges. Another dangerous outbreak took place at Barrackpur on 29 March. The arrival of a British regiment from Burma and the disbandment of the disaffected regiments was thought to have ended the trouble, but it soon became evident that disaffection, which had only wanted an occasion, was spreading rapidly not only among the Sepoys, but among the Hindus generally. Another outbreak took place on 2 May, near Lucknow, when a regiment of cavalry were, by some oversight of the government's instructions, ordered to bite their cartridges. Sir Henry Lawrence succeeded by a show of force in disarming it. A more formidable outbreak occurred about the same time at Meerut, 35 miles northeast of Delhi, when the mutineers, with the assistance of the native inhabitants, indiscriminately massacred the Europeans and escaped to Delhi. The advance-guard of the mutineers reached Delhi on 11 May, and at once entered the city, where they were assisted by the king's servants in massacring the Europeans. The native troops cantoned outside the city in the meantime joined the main body of the mutineers, and assisted in massacring their European officers. About 50 Europeans sought refuge in the palace and placed themselves under the protection of the king, who had placed himself on the throne of the Moguls. These, after some days, were coolly murdered in an open court in presence of a general concourse of spectators, conspicuous among whom was Mirza Mogul, the king's eldest son, who had assumed the title of commander-in-chief. The magazine at Delhi had been blown up by its defenders; but the explosion was only partial, and most of its contents fell into the hands of the mutineers. European troops were now summoned from all quarters. Several regiments were detached from an expedition which was proceeding under Lord Elgin to China, and the Persian War having been concluded, the troops engaged there were immediately recalled. When intelligence of these events reached the Punjab, the mutinous spirit which prevailed among the large body of Hindustani troops there was promptly subdued by disarmament. The Sikhs, though the Punjab had been so recently annexed, continued faithful. But the revolt had spread rapidly elsewhere, and British authority was almost extinct, throughout the Bengal presidency. Everywhere the mutiny was attended with savage excesses — women were outraged, and Europeans, without distinction of age or sex, barbarously murdered. Sir Hugh Wheeler, at Cawnpore, was betrayed by Nana Sahib, maharajah of Bithur, who after offering aid, took the mutineers into his pay, and raising the Mahratta standard, besieged Cawnpore. The siege, or rather bombardment, lasted from 7–24 June, when a capitulation was agreed to, on a sworn promise of Nana Sahib to allow the garrison to retire to Allahabad. But as the embarkation was proceeding the boats were attacked by the Nana's troops and the men indiscriminately massacred. The women and children were for the meantime made prisoners. Sir Henry Lawrence was besieged in Lucknow, where he died on 4 July, from a wound received in a sortie.

Meanwhile mutineers had been converging on Delhi, and British reinforcements were hastening to the besieging camp on the ridge above the city. After protracted operations and repeated reinforcements on both sides, Delhi was taken by assault, 14–20 September. Sir Henry Havelock, who had been engaged in the Persian campaign, had arrived in Calcutta, and immediately set out for Allahabad, to commence operations for the relief of Lucknow and Cawnpore. While his force was victoriously advancing on Cawnpore, Nana Sahib on 15 July barbarously massacred his prisoners, consisting of 210 women and children. Havelock was succeeded in the command, at Lucknow, by Sir James Outram, who held it till relieved by Sir Colin Campbell, on 17 November. At first it was feared that the mutiny might extend to the Bombay and Madras presidencies, and from this cause and the occupation of the troops in Bengal, the mutineers had been left unchecked in Central India. At length columns organized in these presidencies entered Central India, and were united under Sir Hugh Rose. By the operations of these commanders the brave Rani of Jhansi, who died fighting at the head of her troops, was defeated, and Tantia Topi, whose military capacity had prolonged Nana Sahib's resistance, was captured and the mutiny was finally suppressed. The war was substantially closed by June 1858, although the complete pacification of Oudh was not effected till the end of the year. During the mutiny the Sikhs and Gurkhas remained loyal; and the bulk of the population was at least passively so. The sup-

pression of the revolt was followed by a full amnesty to the rank and file who had not borne a hand in the massacre of Europeans, and by the transfer to the British government of the powers possessed by the East India Company. (See INDIA, EAST INDIA COMPANY). Consult the histories of the Mutiny, by Forrest (1904); Holmes, (1898); and Malleson (1878–80).

INDIAN OCEAN, that body of water which has Asia on the north, the East Indian Islands, Nicobar and the Andaman Islands, Australia and Tasmania on the east, Africa on the west, and the Antartic continent on the south. The Cape of Good Hope and the southern extremity of Tasmania may be considered its extreme limits from east to west. Its length from north to south somewhat exceeds 6,500 miles, its breadth varies from 6,000 to 4,000 miles. Its gulfs are the Red Sea, the Gulf of Aden, the Persian Gulf, the Gulf of Oman, the Arabian Sea, the Bay of Bengal and the Great Australian Bight. Its islands are Ceylon, Madagascar, the Laccadives, Maldives, Socotra, Andamans, Nicobar, Mauritius, Bourbon, Kerguelen's Land, etc. The Ganges, Brahmaputra, Irrawaddy, Indus and Euphrates, empty into the Indian Ocean from Asia, and the Zambezi and Limpopo from Africa. The southeast tradewind blows between the 10th and 28th parallels of south latitude from April to October, after which date its limits are contracted; south of these are the northwest winds which prevail almost in the same latitude, in the Atlantic and Pacific. The monsoons are mainly in the north, from the continent of Asia to about latitude 8° S., and from the Mozambique Channel on the west to the western shores of Australia and the Sea of China. They blow for six months, changing about the equinoxes. North of the equator the northeast monsoon prevails from October to April, the southwest from April to October; while south of that the northwest monsoon blows while the northeast is blowing on the north side; and the southeast prevails during the time of the southwest monsoon north of the equator. In the hot season, likewise, when the southeast trade-wind recedes south, the northwest monsoon blows between the equator and the 12th south parallel. The hurricanes of this ocean usually range between lat. 9° and 35° S., extending from Madagascar to the Island of Timor. They usually come from the northeast, and travel southwest and south, returning again east. Their season is from December to April.

According to the most recent soundings the mean depth of the Indian Ocean is 2,300 fathoms, or somewhat greater than that of the Atlantic. The greatest depths are in the eastern part to the south of the equator, where it is estimated that there are fully 50,000 square miles with a depth of over 3,000 fathoms. The deepest sounding has been recorded off the southeast coast of Java, 20,340 feet. Over 13,000,000 square miles lie between the depths of 2,000 and 3,000 fathoms.

The area of land draining into the Indian Ocean is estimated at 6,813,600 square miles, and the rainfall on this land amounts to 4.379 cubic miles of water annually. The rivers flowing from the Asiatic continent are by far the most important, and they carry a vast amount of detritus into the Bay of Bengal and Arabian Sea, these forming immense deposits of blue mud. Along the African coasts, in depths from 100 to 1,000 fathoms, there are glauconitic sands and muds, and on these as well as other coasts, coral muds and sands, and blue and green muds in the shallower depths. In the deeper parts of the ocean, far from land, there are deposits of red clay, radiolarian-ooze, and globigerina-ooze. Toward the Antarctic continent the ocean bed is covered with a diatom-ooze.

The temperature of the surface waters varies much in different parts of the ocean, at different seasons, and under the influence of different winds. In tropical regions the temperature usually varies from 70° to 80° F., and the yearly range is 7° or 8° F. Off the Cape of Good Hope and Cape Guardafui, the annual range may be from 20° to 30° F. Sudden changes of temperature are often noticed off Cape Guardafui when the wind blows off shore.

The cold and deep water is thus drawn up along the coast to take the place of the warm surface water which is driven east by the wind.

The temperature of the water at the bottom is very uniform and subject to little, if any, annual variation. In the Bay of Bengal and Arabian Sea temperatures of 33.7° F. and 34.2° F. have been recorded; these are only very slightly higher than those recorded by the Challenger in lat. 50° S. It is certain, therefore, that this deep cold water is slowly drawn into the Indian Ocean from the Antartic to supply the place of the warm surface currents that are driven south by the winds.

The currents of the Indian Ocean are less constant than in the other oceans, being largely controlled by the monsoons. Some characteristic coral atolls and islands are found toward the central part, such as the great Maldive group, the Chagos, Diego Carcia, and the Cocos Islands. The tropical shores are generally skirted by fringing and barrier reefs which render navigation dangerous. Christmas Island is coral formation, while Saint Paul's, Manuritius, Rodriguez and others are of volcanic origin, and Madagascar, Ceylon, and Socotra, continental islands.

The Indian Ocean was little known to the ancients. The first Europeans who explored it seem to have been the Phœnicians, who in the 7th century B.C., held the thalassocracy, or marine domination, of the Mediterranean. Necho, an Egyptian monarch who flourished about 610 B.C., is reported by Herodotus to have sent some of his vessels, manned by Phœnicians, into the Indian Ocean, then known as the Erythræan Sea, to circumnavigate Africa. This they did, starting from the Arabian Gulf and regaining Europe by the Columns of Hercules. In the 6th century B.C. this sea was traversed by Hanno, a Phœnician admiral of Carthage. There is still extant his account of the voyage which is translated into Greek under the title 'Hanno's Voyage of Circumnavigation.' The Greek historian Arrian has given us an account of the coasting voyage of Nearchus, one of Alexander's generals, from the Indus to the mouth of the Tigris and Euphrates.

Hippalus, an Egyptian navigator who flourished about the beginning of the Christian era, was the first to observe the regular monsoons of the Indian Ocean, and to profit by them. In the 9th century the Arabs made frequent

voyages across the Indian Ocean. In 1486 the Portuguese rounded the Cape of Good Hope, and in 1498 Vasco da Gama reached the coasts of India by the same route. In 1521 a ship of Magellan's squadron crossed the Indian Ocean in completing the first circumnavigation of the world, and has since been habitually traversed in a direct line between Arabia and Hindustan.

INDIAN OIL TREE. See BUTTER TREE.

INDIAN PAINT, the name of two American plants: (1) the golden seal (q.v.) or orange-root, which furnishes a yellow color; and (2) the bloodroot. See SANGUINARIA.

INDIAN AND PERSIAN LACQUER-WORK. See LACQUERS AND LACQUERWORK.

INDIAN PHYSIC, an American plant. See BOWMAN'S ROOT.

INDIAN PIPE, or **CORPSE-PLANT,** a smooth, waxy-looking, fleshy herb (*Monotropa uniflora*), of the family *Monotropaceæ*, widely distributed in dark, rich woods almost throughout North America and in eastern Asia. It is said to derive some of its food from the roots of other plants, but much is obtained from decaying vegetable matter. From a matted mass of fibrous rootlets the white scaly stems rise to a height of perhaps eight inches, and bear solitary, nodding, white, inodorous flowers during the summer, followed by erect many-seeded fruits.

INDIAN RED, an impure oxid of iron, used as a pigment by painters. It was originally imported from India, but is now chiefly prepared by roasting ferrous sulphate. The sulphuric acid is expelled by the heat, and the red oxid of iron remains behind. It is very permanent, and the color varies from purplish to a yellowish red.

INDIAN RESERVATIONS. When the settlers from Europe came to realize that the Indians had human rights, and ought not to be enslaved or exterminated, the rule was generally adopted of confining the tribes to reservations, both for their own protection from unprincipled whites, and for the security of the white population. New York, Massachusetts, Connecticut, Rhode Island and other States enforced this policy in the colonial period and after independence, and the United States government has carried it out from an early date. Southern tribes east of the Mississippi were removed to the Indian Territory, which since 16 Nov. 1907 has become a part of the State of Oklahoma. Designated by solemn pledge of the National government as a permanent home for their race, there some of the tribes achieved a high degree of civilization, gained considerable wealth and merged into American citizenship. They are largely intermarried with whites, and to some extent with negroes, whom they formerly held as slaves. Other tribes, chiefly from the southwest, were gathered into the Indian Territory, but large Indian reservations, mainly of Sioux, are still maintained in the northwest, and altogether the various tribal reservations in the different States and Territories number 115. The reservations are carefully guarded against intrusion by unscrupulous whites, and provision is made for the intellectual and physical welfare of the Indians, and for leading them to adopt civilized methods of self-support, instead of depending on the chase, which now offers only the most precarious returns, or on government aid, which, however, is not withdrawn under any circumstances while an Indian is in need of it. The sale of intoxicating liquor to Indians is severely punished when detected, but the law is frequently evaded. See CHEROKEE; CHICKASAW; CHOCTAW; CREEKS; INDIAN AFFAIRS; INDIANS, AMERICAN; SEMINOLE INDIANS.

INDIAN RIVER, a long lagoon in the eastern part of Florida, in Brevard and Volusia counties. It connects with the Halifax River at Titusville and extends 100 miles southeast to the ocean at Indian Inlet. Its width varies from 300 feet to 3 miles and it is navigable for vessels drawing five feet. The Indian River is famous for the excellent oranges grown along its banks.

INDIAN SCHOOLS, in the United States, are schools especially established either by private or denominational means or by the national government, for the education of children and youth of the Indian population of this country. For particulars concerning these schools see INDIAN AFFAIRS; INDIANS, EDUCATION OF THE.

INDIAN SHOT. See CANNA.

INDIAN SUMMER, the name given to a period of mild and pleasant weather which generally occurs toward the end of autumn. The term first made its appearance in the last decade of the 18th century. During the next decade the phrase was "second summer." This indicates that the spell of weather known by this name was not generally noticed much before 1800. The term Indian summer became established about 20 years after its first appearance, which was in western Pennsylvania, and spread to New England by 1798, to New York by 1799, to Canada by 1821, and to England by 1830. The term, is, then, not an Americanism; to write in praise of Indian summer is now a literary convention of three continents.

It is by no means easy to account for the origin of the term. The principal characteristics of the season which it describes are haziness, smokiness, and high temperature. Some explanations of the origin of the term are (1) that the Indians predicted such spells of weather; (2) that the smokiness was produced by Indian fires; (3) that this was the last season of Indian attacks on the settlements of the whites; (4) that the season partook of the Indian character of deceptiveness; (5) that the name was given because one of the seasons of East India was similar in character. Horace Walpole used the term in 1778, not in reference to America, but in relation to weather in the tropics. "Squaw winter" was a name for the spell of cold weather preceding the Indian summer, and perhaps the key to the nomenclature is to be sought in this latter term. Analogous terms in use in England and Germany are: "Saint Martin's Summer," "All Hallow Summer," "Saint Luke's Summer," "Old Woman's Summer." Consult *Monthly Weather Review* (Vol. XXX, pp. 19–29; 69–79, Washington 1902).

INDIAN TERRITORY. See OKLAHOMA.

INDIAN TURNIP, a plant, *Arisæma triphyllum*, of the Arum family, known also as Jack-in-the-pulpit. It is one of the best known spring flowers of eastern North America, blos-

soming in April or May. The leaves are compound, each composed of three large entire leaflets; the "flower" really consists of a club-shaped spike of small greenish flowers surrounded by a large, hooded, corolla-like spathe, usually green striped with purple. In summer a spike of bright red berries is produced. The root is bulblike and contains a very acrid juice.

INDIAN or WILD TOBACCO, one of the North American lobelias (*Lobelia inflata*), also called asthma-weed and gag-plant; compare KINNIKINICK.

INDIAN YELLOW, known in commerce as PUREE, a pigment of unknown origin which is exported from India, China and probably Arabia.

INDIANA ("The Hoosier State"), a north-central State of the United States (No. 19 in order of admission) bounded north by Michigan, south by Kentucky, east by Ohio, west by Illinois; extreme length 276 miles, extreme breadth 177 miles; area (No. 34 in United States) 36,350 square miles, 440 water; pop. 1910 (No. 8 in United States) 2,700,876, or 75.3 to the square mile (No. 11 in density). The State boundary in Lake Michigan is an east and west line 10 miles north of the extreme southern point of the lake. The Ohio River runs along the southern boundary, but, by a provision of the Virginia cession of Northwest Territory, Indiana extends only to low-water mark on the north bank of the Ohio. In consequence all islands in the Ohio belong to Kentucky, the Supreme Court having recently held this as Green River Island (Indiana *v.* Kentucky. 136 U. S.) which, although an island at the time of the cession, became connected with Indiana shore by alluvial deposits, and had been governed and taxed as part of Indiana for many years.

Topography.— The surface of the State is comparatively level; the highest point, in Randolph County, in the centre of the eastern tier of counties, being estimated at 1,285 feet above sea-level, and the lowest, at the southwest corner of the State, being 313 feet above sea-level. The Ohio at the southeast corner of the State is 436 feet above sea-level, and Lake Michigan at the northwest corner is 585 feet above sea-level. From the table-land of the east central part of the State, and western Ohio, radiate low water-sheds separating the drainage basins of Indiana. The northern part of the State is quite flat, the central part slightly rolling, and the southern part rather hilly on account of the valleys cut out by water. There are no mountains, and no large lakes, but there are hundreds of small lakes, chiefly in the northern part of the State.

River Systems.— The southern parts of the State are drained to the Ohio River by the Whitewater and smaller tributaries. The central part of the State — about four-fifths of its area — is drained by the Wabash and its tributaries, the most important of which are the White, Tippecanoe, Eel, Salamonie and Mississinewa Rivers, and Wild Cat Creek. The northeastern corner of the State is drained by the Saint Joseph's and Saint Mary's Rivers; these unite at Ft. Wayne to form the Maumee, which flows into Lake Erie. The extreme northern part of the State is drained by another Saint Joseph's, the Calumet and smaller streams, into Lake Michigan. A part of the northwestern section is drained by the Kankakee and its tributaries to the Illinois River. The Wabash is navigated to a limited extent, by small boats, as high as Terre Haute, and also the lower part of White River. The remaining streams are not navigated.

Climate.— The climate of Indiana is mild, ranging from an average of 31° F. in the winter months to an average of 76° in summer. The mean temperature is 53°. The average annual rainfall is 43 inches, that in the southern part of the State being slightly in excess of that in the northern part. Serious droughts and destructive storms are rare. In earlier years parts of the State were malarial, but with the clearing of the forests and the drainage of lands this condition has almost wholly disappeared.

Geology.— The earliest geological formation that outcrops in Indiana is the Hudson and Trenton limestone, of the Silurian Age, which appears in the southeastern corner of the State, throughout the Whitewater Valley and the adjacent region. West of this is a belt of Niagara limestone, which broadens at the north and extends entirely across the State, covering all of a dozen counties and large parts of as many more. On the west of this, and also extending to the State line on the north, are belts of Hamilton limestone and sandstone of the Devonian Age. The remainder of the State — the southwestern corner and a broad belt to the north reaching beyond the Wabash — is of the subcarboniferous and carboniferous formations. The northern and central parts of the State are covered by glacial drift, which in some regions is of a depth of 400 feet.

Soils, Agriculture and Forests.— The soil of the State varies in character, but for the most part is fertile. Originally the southern part of the State, and as far north as the Wabash, was covered with a very heavy growth of forest, mostly of hardwood trees. North of this were low prairies interspersed with sand ridges and dotted with hundreds of small lakes. This region is now found very productive of cucumbers, melons and small fruits in the sandy parts. The richest lands are the alluvial valleys of the streams and the drained prairies. The forests have so far disappeared that the State is now encouraging tree planting. Agriculture is the chief industry of the State, although statistical returns show the products of manufactures greater than those of agriculture. This is partly due to the fact that the profits of manufactures are greater, partly to the fact that new material which is largely agricultural product enters into the value of manufactured products, and partly to the fact that statistics of agricultural products do not include the large amount that goes into the "living" of agricultural labor. In 1910 there were 344,454 persons engaged in agriculture as against 310,402 in manufacturing and mechanical industries. The reported value of farm products in 1914 was about $210,000,000. The chief agricultural products were corn 154,191,465 bushels, oats 43,113,793 bushels, wheat 38,450,121 bushels, potatoes 4,489,961 bushels, hay 1,883,356 tons. The value of animal products was about $80,000,000; of forest products $4,000,000; of orchard products $3,500,000; of dairy products $16,000,000. The value of the poultry raised in 1914 was about $3,600,000, and of the eggs produced $15,000,000.

Minerals and Mining Industries.—About one-fifth of the surface of Indiana is underlaid by coal, workable veins having been found in 19 counties. There are at least 7 distinct veins of workable thickness, varying from 3 to 11 feet. The coals of the State are of two classes—caking or bituminous, and non-caking or block coal. The latter can be burned in blast furnaces without coking. The production in 1914 was 15,696,921 tons, valued at over $16,000,000, the State ranking sixth in the Union as to quantity and seventh as to value of the product. The number of people employed in coal mining was 20,702. Another important mineral product is petroleum, the production of which is a comparatively a new industry. In 1908 the oil product of the State was 3,283,629 barrels, valued at $3,203,883. It largely increased—over one-third—after 1902, but has since fallen off, the production in 1914 being about 1,500,000 barrels, valued at $1 per barrel. Next in value to coal of the mineral products of the State is building-stone, of which the chief varieties are the oolitic limestone, the blue Devonian limestone, the gray Niagara limestone, and sandstone. The oolitic so-called because composed of minute fossil shells resembling a mass of fish eggs, has become celebrated throughout the United States on account of its superior qualities. In 1901 Indiana was first in rank in the Union in the production of limestone for building purposes, and fifth in rank as to building-stone of all kinds, the product being valued at $3,028,145. The production of building stone in 1914 was $3,500,000; and there was a further quarry product of about $2,000,000, used for cement, lime, road-making, etc. There is also a large production of cement and lime. Good clay is abundant throughout the State, and brick and tile making are extensive industries. Kaolin and glass sand are also found in quantity in several counties, and are profitably mined. Natural gas has been found, by sinking wells, throughout a large part of the State. The supply at one time reached a daily flow of 900,000,000 cubic feet. It served to draw many manufactories to the State, but the pressure is now decreasing. In many places its cessation has been followed by a flow of petroleum. Many other minerals have been found in Indiana, but not in quantities of commercial importance.

Manufactories.—The manufactures of Indiana are chiefly a development of the past 40 years. In the earlier period manufacturing was confined almost wholly to supplies for domestic consumption, and was chiefly conducted at the homes of the people. In 1914 there were reported 8,022 manufacturing establishments in the State, employing 197,503 wage-earners, and producing goods of the value of $730,795,000. The nine leading industries, ranked according to value of products in 1914, were: (1) iron and steel works, product $58,883,000; (2) slaughtering and packing, product $51,066,000; (3) foundries and machine shops, product $48,881,000; (4) distilling and brewing, product $43,420,000, of which about three-fourths is credited to distilled liquors; (5) railway car construction and repair, product $42,156,000; (6) flour and grist mills, product $37,488,000; (7) automobiles, product $29,390,000; (8) carriages and wagons, product $21,569,000; (9) lumber and timber, product $21,034,000.

The value of flour and grist mill products and lumber and timber products have remained nearly stationary for the last decade, but slaughtering and packing have increased. The notable increases, however, have been in iron and steel work, machinery, and various forms of vehicles. The central position of Indiana gives facilities for distribution which will presumably cause a continued advance in manufacturing industries.

Commerce and Navigation.—About one-tenth of the people of Indiana (in occupations) are engaged in commerce and transportation. The navigation of the State is limited, being confined to the Ohio River on the south, with the lower Wabash and a small part of the White River, and Lake Michigan on the northwest. The canals of the State are practically abandoned except for water-power. The railroads furnish the chief means of transportation. Commerce is chiefly domestic, but both exportation and importation are steadily increasing.

Fisheries.—Indiana has no fisheries of commercial importance, though it has waters that might be made valuable. Recently laws have been passed for the protection of fish, and some interest is being shown in their propagation.

Railroads and Street Railways.—The railroad mileage of Indiana, in 1914, was 7,232 miles, exclusive of second main and side tracks. In 1850 it was 228 miles; in 1880, 4,320. Railroad lines extend through all but three counties in the State. The chief railroad centre is Indianapolis, from which 14 lines radiate. These are connected outside of the city by a belt railway. The valuation of railroad property for taxation in 1914 was $208,941,570. There are street railways in all of the cities and larger towns, the total aggregating 195 miles. In 1899 there began an extraordinary development of electric interurban lines. By the close of 1902 about 400 miles of these were in operation, and 500 miles were under construction, while new lines aggregating over 1,000 miles were projected. The interurban mileage in 1914 was 2,085 miles, and the total valuation $26,965,732, which is about one-seventh of true value. These lines have made a material change in the transportation of both passengers and freight, and will apparently furnish large competition with the steam railroads. One of these lines operating between Indianapolis and Columbus, Ohio, has added sleeping-cars to its equipment.

State Finances.—The assessed valuation of the State in 1914 was $1,967,434,189, of which $1,291,549,845 was for realty property and the remainder for personal and corporations. Individuals are permitted to deduct *bona fide* mortgage indebtedness from their schedules to the amount of $700. The total number of polls is about 450,000. The State tax levy for general State government was seven cents on $100, and 50 cents poll; for the benevolent institutions 10 cents; for sinking fund 1.5 cents; for State tuition—which is distributed to the school districts for support of the common schools—13.6 cents and 50 cents poll; for State institutions of higher education seven cents; vocational education one cent, making a total State levy of 40.1 cents and $1 poll. The reduction of the State debt was begun in 1889, when it amounted to over $10,000,000. On 31 Oct. 1902, it had been reduced to $2,887,615.12, on which

INDIANA.

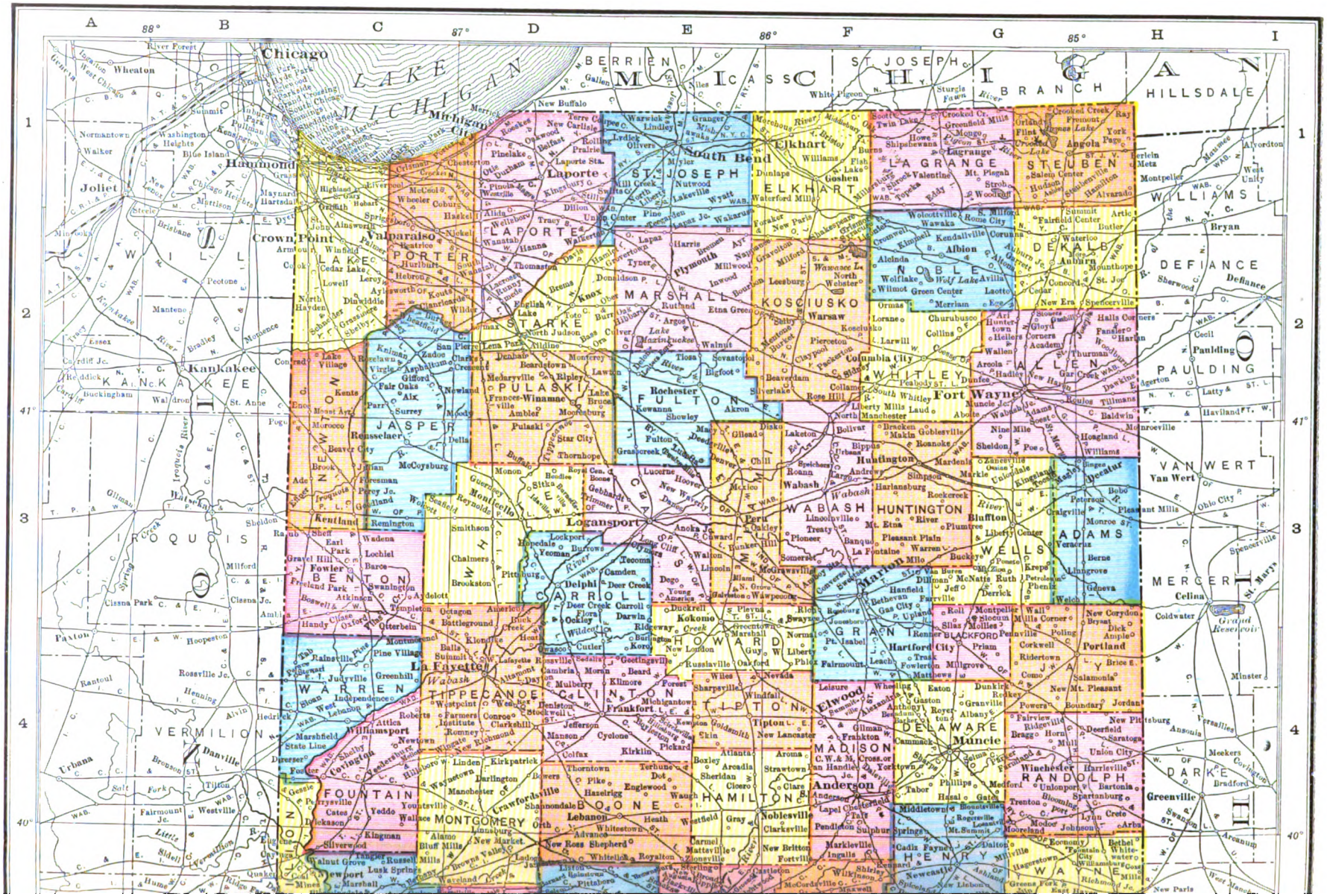
Estimated population, 2,816,817

COUNTIES

Pop.		
21,840	Adams	H 3
93,386	Allen	G 2
24,813	Bartholomew	F 6
12,688	Benton	C 3
15,820	Blackford	G 4
24,673	Boone	E 4
7,975	Brown	E 6
17,970	Carroll	D 3
36,368	Cass	E 3
30,260	Clark	F 8
32,535	Clay	C 6
26,674	Clinton	E 4
12,057	Crawford	D 8
27,747	Daviess	C 7
21,396	Dearborn	H 6
18,793	Decatur	F 6
25,054	Dekalb	G 2
51,414	Delaware	G 4
19,843	Dubois	D 8
49,008	Elkhart	F 1
14,415	Fayette	G 6
30,293	Floyd	F 8
20,439	Fountain	C 4
15,335	Franklin	G 6
16,879	Fulton	E 2
30,137	Gibson	B 8
31,426	Grant	F 4
36,873	Greene	D 6
27,026	Hamilton	E 4
19,030	Hancock	F 5
20,232	Harrison	E 8
20,840	Hendricks	D 5
29,758	Henry	G 5
33,177	Howard	E 4
28,982	Huntington	F 3
24,727	Jackson	E 7
13,044	Jasper	C 3
24,961	Jay	G 4
20,483	Jefferson	G 7
14,203	Jennings	F 7
20,394	Johnson	E 6
39,183	Knox	C 7
27,936	Kosciusko	F 2
15,148	Lagrange	G 1
82,864	Lake	C 2
45,797	Laporte	D 2
30,625	Lawrence	D 7
65,224	Madison	F 4
263,661	Marion	E 5
24,175	Marshall	E 2
12,950	Martin	D 7
29,350	Miami	E 3
23,426	Monroe	D 6
29,296	Montgomery	D 4
21,182	Morgan	E 6
10,504	Newton	C 3
24,009	Noble	G 2
4,329	Ohio	H 7
17,192	Orange	D 7
14,053	Owen	D 6
22 214	Parke	C 5
18 078	Perry	D 8
19 684	Pike	C 8
20 540	Porter	C 2
21 170	Posey	B 8
13 312	Pulaski	D 2
20 520	Putnam	D 5
29 013	Randolph	G 4
19,452	Ripley	G 6
19.349	Rush	G 5
84,312	St Joseph	E 1
8,323	Scott	F 7
26,802	Shelby	F 6
20,676	Spencer	D 8
10,567	Starke	D 2
14,274	Steuben	G 1
32,439	Sullivan	C 6
9,914	Switzerland	G 7
40,063	Tipp. canoe	D 4
17,459	Tipto	E 4
6,260	Union	H 5
77,438	Vanderburg	B 8
18,865	Vermillion	C 5
87,930	Vigo	C 6
26,926	Wabash	F 3
10,899	Warren	C 4
21,911	Warrick	C 8
17,445	Washington	E 7
43,757	Wayne	G 5
22,418	Wells	G 3
17,602	White	D 3
16,892	Whitley	F 2

Incorporated Cities, Towns, and Villages

Pop.		
416	Advance	D 4
161	Aetna	C 1
209	Alamo	C 5
1,289	Albany	G 4
1,213	Albion	G 2
5,096	Alexandria	F 4
161	Alton	E 8
349	Altona	G 2
359	Ambia	B 3
521	Amboy	F 3
23,996	Anderson	F 4
957	Andrews	F 3
2,610	Angola	H 1
990	Arcadia	E 4
1,088	Argos	E 2
639	Ashley	G 1
876	Atlanta	E 4
3,335	Attica	C 4
3,919	Auburn	H 2
4,410	Aurora	H 6
579	Avilla	G 2
449	Bainbridge	D 5
2,151	Batesville	G 6
443	Battle Ground	D 4
10,349	Bedford	E 7
568	Beech Grove	E 5
1,316	Berne	H 3
2,794	Bicknell	C 7
439	Birdseye	D 8
2,069	Bloomfield	D 6
528	Bloomingdale	C 5
11,383	Bloomington	E 6
4,987	Bluffton	G 3
3,934	Boonville	C 8
122	Boston	H 5
814	Boswell	C 3
1,163	Bourbon	E 2
336	Bowling Green, Clay	C 6
10,315	Brazil	C 5
2,008	Bremen	E 2
535	Bristol	F 1
770	Broadripple	E 5
300	Bronson, Randolph	H 4
1,067	Brook	C 3
572	Brooklyn	E 5
150	Brooksburg	G 7
907	Brookston	D 3
2,169	Brookville	G 6
876	Brownsburg	E 5
1,492	Brownstown	E 7
469	Bryant, Jay	G 4
668	Bunker Hill	E 3
489	Burnettsville	D 3
1,818	Butler	H 2
209	Cadiz	F 5
2,237	Cambridge City	G 5
557	Camden	E 3
666	Campbellsburg	E 7
300	Cannelburg, Daviess	C 7
2,130	Cannelton	D 9
493	Carbon	C 5
850	Carlisle	C 7
626	Carmel	E 4
873	Carthage	F 5
194	Castleton	F 5
911	Cayuga	B 5
185	Cedar Grove	H 6
414	Center Point	D 6
1,019	Centerville	G 5
513	Chalmers	D 3
864	Charlestown	F 8
285	Chesterfield	F 4
1,400	Chesterton	D 1
524	Chrisney	D 8
870	Churubusco	G 2
990	Cicero	E 4
463	Clarks Hill	D 4
2,743	Clarksville, Clark	F 8
1,213	Clay City	C 6
408	Claypool	F 2
380	Claysburg, Clark	F 8
497	Clayton	E 5
205	Clermont	E 5
210	Clifford	F 6
6,229	Clinton	C 5
624	Cloverdale	D 5
472	Coatesville	D 5
801	Colfax	D 4
[103	College Park, Huntington	G 3
3,448	Columbia City	F 2
9,241	Columbus	E 6
7,738	Connersville	G 5
1,164	Converse	F 3
318	Corunna	G 2
1,703	Corydon	E 8
2,069	Covington	C 4
133	Crandall, Harrison	E 8
1,164	Crawfordsville	D 4
520	Cromwell	F 2
1,038	Crothersville	F 7
2,526	Crown Point	C 2
[810	Culver	E 2
[610	Cynthiana	B 8
583	Dale	D 8
748	Dana	C 5
1,640	Danville	D 5
780	Darlington	D 4
4,471	Decatur	H 3
2,161	Delphi	D 3
1,070	Diamond, Parke	C 5
425	Dillsboro	G 6
704	Dublin	G 5
1,226	Dugger	C 6
3,031	Dunkirk	G 4
181	Dunreith	F 5
545	Dyer, Lake	C 2
609	Earl Park	C 3
28,743	East Chicago	C 1
706	East Connersville, Fayette	G 5
484	East Gary	C 1
302	East Germantown, Wayne	G 5
1,428	Eaton	G 4
2,040	Edinburg	E 6
438	Elberfeld	E 8
238	Elizabeth	F 8
350	Elizabethtown	F 6
21,858	Elkhart	F 1
676	Ellettsville	D 6
961	Elnora	C 7
11,028	Elwood	F 4
583	English	D 8
431	Etna Green	E 2
76,078	Evansville	B 9
2,506	Fairmount	F 4
630	Fairview Park, Vermilion	C 5
1,115	Farmersburg	C 6
907	Farmland	G 4
827	Ferdinand	D 8
188	Fishers Station, Hamilton	E 4
1,386	Flora, Carroll	D 3
111	Forest Hill	F 6
1,182	Fort Branch	B 8
1,174	Fortville	F 5
76,183	Fort Wayne	G 2
448	Fountain City	H 5
1,491	Fowler	C 3
293	Fowlerton	F 4
729	Francesville	D 2
407	Francisco	B 8
9,596	Frankfort	E 4
4,502	Franklin	E 6
936	Frankton	F 4
271	Fredericksburg	E 8
694	Fremont	H 1
1,803	French Lick	D 7
296	Fulton	E 3
658	Galveston	E 3
4,149	Garrett	G 2
16,802	Gary	C 1
3,224	Gas City	F 3
638	Gaston	G 4
1,140	Geneva	H 3
383	Gentryville, Spencer	D 8
331	Georgetown	E 8
266	Glenwood	G 5
1,105	Goodland	C 3
8,955	Goshen	F 1
776	Gosport, Owen	D 6
735	Grandview	C 9
3,790	Greencastle	D 5
697	Greendale, Dearborn	H 6
4,448	Greenfield	F 5
250	Greensboro, Henry	G 5
5,420	Greensburg	G 6
1,166	Greentown	E 4
227	Greenville, Floyd	F 8
1,608	Greenwood	E 5
275	Griffin	B 8
523	Griffith	C 2
936	Hagerstown	G 5
579	Hamlet	D 2
26,171	Hammond	B 1
356	Hanover	F 7
254	Hardinsburg	E 8
6,187	Hartford City	G 4
358	Hartsville	F 6
648	Hazleton	C 8
821	Hebron	C 2
304	Highland	C 1
528	Hillsboro	C 4
1,753	Hobart	C 1
1,223	Hope	F 6
390	Hudson	G 1
2,464	Huntingburg	D 8
10,880	Huntington	F 3
197	Huron	D 7
1,515	Hymera	C 6
271,708	Indianapolis	F 5
322	Ingalls	F 5
690	Jamestown	D 5
3,295	Jasonville	D 6
2,196	Jasper	D 8
10,412	Jeffersonville	F 8
1,573	Jonesboro	F 3
213	Jonesville	F 6
141	Judson, Parke	C 5
600	Kempton	E 4
4,981	Kendallville	G 2
449	Kennard	F 5
1,209	Kentland	C 3
728	Kewanna	E 2
242	Keystone, Wells	G 3
535	Kingman	C 5
699	Kirklin	E 4
2,008	Knightstown	G 5
1,081	Knightsville	D 5
1,644	Knox	D 2
20,930	Kokomo	E 3
683	La Fontaine	F 3
82	Laconia, Harrison	E 8
1,148	Ladoga	D 5
21,286	Lafayette	C 4
1,772	Lagrange	G 1
463	Lagro	F 3
227	Lakeville	E 1
290	Lanesville	F 8
1,045	Lapel	F 4
13,202	Laporte	D 1
503	Laurel	G 6
3,930	Lawrenceburg	H 6
690	Leavenworth	E 8
5,474	Lebanon	D 4
401	Leesburg	F 2
446	Lewisville	G 5
1,338	Liberty	H 5
2,173	Ligonier	F 2
556	Linden	D 4
5,906	Linton	C 6
195	Little York	E 7
197	Livonia	E 7
224	Lizton	D 5
21,046	Logansport	D 3
2,154	Loogootee	D 7
1,235	Lowell	C 2
917	Lynn	H 4
297	Lynnville	C 8
993	Lyons	C 7
320	Macy	E 3
6,934	Madison	G 7
686	Marengo	E 8
19,834	Marion	F 3
820	Markle	G 3
334	Marshall	C 5
4,529	Martinsville	D 6
688	Matthews	G 4
279	Mauckport	E 8
710	Medaryville	D 2
372	Mellott	C 4
728	Mentone	F 2
521	Merom	B 6
21,512	Michigan City	D 1
395	Michigantown	E 4
600	Middlebury	F 1
1,174	Middletown	G 4
557	Milan	G 6
814	Milford	F 2
169	Milford, Decatur	F 6
638	Miller	C 1
428	Millersburg	F 1
211	Millhousen, Decatur	F 6
586	Milltown	E 8
601	Milton	G 5
16,385	Mishawaka	E 1
3,438	Mitchell	D 7
261	Modoc	G 4
1,184	Monon	D 3
334	Monroe	H 3
630	Monroe City	C 7
910	Monroeville	H 3
260	Monterey	D 2
1,537	Montezuma	C 5
511	Montgomery	D 7
2,168	Monticello	D 3
2,786	Montpelier	G 3
94	Moorefield	G 7
455	Mooreland	G 5
424	Moores Hill	G 6
1,608	Mooresville	E 5
667	Morgantown	E 6
927	Morocco	C 3
622	Morristown	F 5
167	Mount Auburn, Wayne	H 5
231	Mount Ayr	C 2
142	Mount Carmel	H 6
148	Mt. Etna	F 3
5,563	Mt. Vernon	B 9
25,424	Muncie	G 4
543	Munster, Lake	C 2
2,260	Nappanee	E 2
354	Nashville	E 6
23,629	New Albany	F 8
134	New Amsterdam	E 8
455	Newberry	C 7
1,097	Newburg	C 9
612	New Carlisle	E 1
13,241	New Castle	G 5
105	New Chicago, Lake	C 2
1,229	New Harmony	B 8
1,038	New Haven	G 2
334	New Market	D 5
145	New Middletown	E 8
450	New Palestine	F 5
246	New Pekin, Washington	E 7
341	Newpoint	G 6
732	Newport	C 5
350	New Providence, Clark	F 8
464	New Richmond	D 4
296	New Ross	D 5
5,073	Noblesville	F 4
1,122	Normal City, Delaware	G 4
1,143	North Judson	D 2
681	North Liberty	E 1
2,428	North Manchester	F 2
569	North Salem	D 5
2,915	North Vernon	F 7
2,370	Oakland City	C 8
608	Oaktown	C 7
1,064	Odon	D 7
956	Oldenburg	G 6
1,079	Olitic, Lawrence	E 7
420	Orestes, Madison	F 4
1,367	Orleans	D 7
1,169	Osgood	G 6
661	Ossian	G 3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Warsaw
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Fort Wayne
PAULDING
Columbia City
Huntington
WABASH
HUNTINGTON
WELLS
ADAMS
VAN WERT
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Decatur
Bluffton
IROQUOIS
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TIPPECANOE
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HOWARD
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Coldwater
Grand Reservoir
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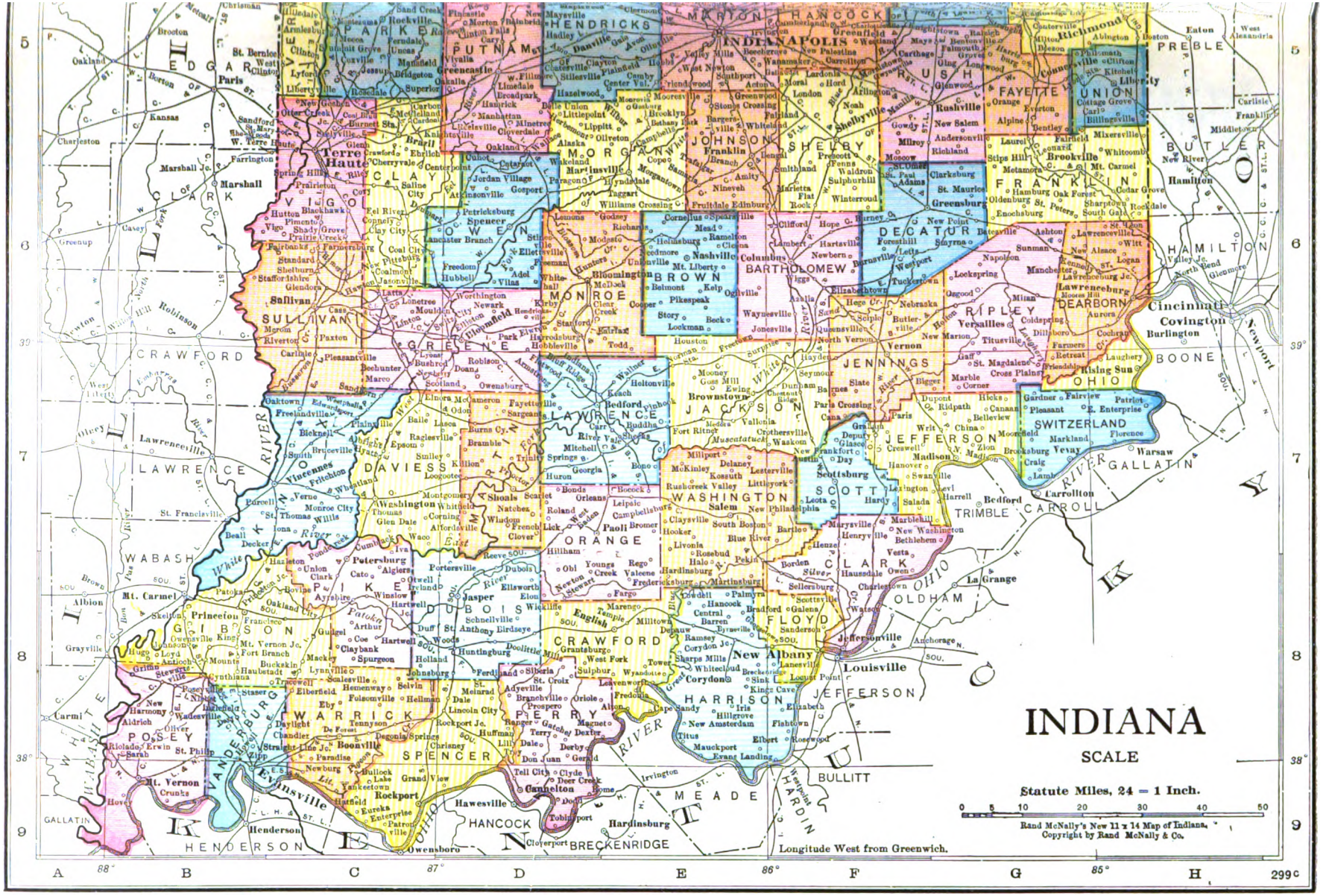
INDIANA
SCALE
Statute Miles, 24 = 1 Inch.
0 5 10 20 30 40 50
Rand McNally's New 11 x 14 Map of Indiana.
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Longitude West from Greenwich.
INDIANAPOLIS
Richmond
Terre Haute
Evansville
New Albany
Louisville
Jeffersonville
Cincinnati
Covington
Newport
Lawrenceburg
Aurora
Rising Sun
Madison
Vincennes
Princeton
Mt. Vernon
Rockport
Boonville
Petersburg
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Tell City
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Pop.		
652	Otterbein	C 3
1,237	Owensville	B 8
1,010	Oxford	C 4
252	Palmyra	E 8
1,278	Paoli	E 7
409	Paragon	D 6
800	Parker	G 4
657	Patoka	B 8
340	Patriot	H 7
1,293	Pendleton	F 4
800	Pennville	G 4
12,410	Peru	E 3
2,170	Petersburg	C 8
817	Pierceton	F 2
352	Pine Village	C 4
408	Pittsboro	D 5
1,303	Plainfield	E 5
3,838	Plymouth	E 2
308	Poneto, Wells	G 3
1,060	Port Fulton, Clark	F 8
524	Porter	C 1
5,130	Portland	H 4
780	Poseyville	B 8
6,448	Princeton	B 8
1,714	Redkey	G 4
982	Remington	C 3
2,393	Rensselaer	C 3
377	Reynolds	D 3
24,697	Richmond	H 3
440	Ridgeview, Miami	E 3
1,302	Ridgeville	G 4
1,513	Rising Sun	H 7
1,505	River Park, St. Joseph	E 1
863	Riverside, Delaware	G 4
849	Roachdale	D 5
447	Roann	F 3
699	Roanoke	G 3
3,364	Rochester	E 2
2,736	Rockport	C 9
1,943	Rockville	C 5
1,166	Rosedale	C 5
677	Rossville	D 4
909	Royal Center	D 3
4,925	Rushville	G 5
443	Russellville	D 5
169	Salamonia	H 4
2,283	Salem	E 7
162	Saltillo, Washington	E 7
445	Sandborn	C 7
410	Saratoga	H 4
1,669	Scottsburg	F 7
1,188	Seelyville	C 5
676	Sellersburg	F 8
350	Selma	G 4
6,305	Seymour	F 7
2,055	Shelburn	C 6
10,965	Shelbyville	F 5
1,768	Sheridan	E 4
1,519	Shirley	F 5
375	Shirley City, Allen	G 2
1,015	Shoals	D 7
783	Silver Grove, Floyd	F 8
493	Silver Lake	F 2
68,946	South Bend	E 1
352	Southport	E 5
866	South Peru, Miami	E 3
1,176	South Whitley	F 2
2,150	Spencer	D 6
622	Spiceland	F 5
122	Spring Grove, Wayne	H 5
391	St. Joe	H 2
261	St. Leon	H 6
538	St. Meinrad	D 8
194	State Line	C 4
746	Staunton, Clay	C 6
497	Stinesville	D 6
234	Straughn	G 5
4,115	Sullivan	C 6
209	Sulphur Springs	F 4
1,387	Summitville	F 4
353	Sunman	G 6
836	Swayzee	F 3
1,379	Syracuse	F 2
3,369	Tell City	D 9
371	Tennyson	C 8
66,083	Terre Haute	C 6
1,508	Thorntown	D 4
4,075	Tipton	F 4
510	Troy	D 8
3,209	Union City	H 4
189	Unlondale	G 3
102	University Heights, Marion	E 5
1,080	Upland	F 3
6,987	Valparaiso	C 2
1,189	Van Buren	G 4
1,757	Veedersburg	C 4
133	Vera Cruz	G 3
453	Vernon	F 7
486	Versailles	G 6
1,256	Vevay	G 7
17,645	Vincennes	C 7
8,730	Wabash	F 3
859	Wakarusa	E 2
1,003	Walkerton	D 2
116	Wallace	C 4
579	Walton	E 3
1,189	Warren	G 3
4,430	Warsaw	F 2
7,854	Washington	C 7
1,167	Waterloo	H 2
676	Waveland	D 5
734	Waynetown	D 4
700	Westfield	E 4
746	West Baden	D 7
432	West College Corner, Union	H 5
281	West Harrison, Dearborn	H 6
867	West Lafayette	D 4
642	West Lebanon	C 4
675	Westport	F 6
3,083	West Terre Haute	C 6
503	Westville	D 1
357	Wheatfield	C 2
343	Whiteland	E 5
112	Whitewater	H 5
6,587	Whiting	C 1
1,243	Williamsport	C 4
1,607	Winamac	D 2
4,266	Winchester	G 4
899	Windfall	F 4
446	Wingate	D 4
932	Winslow	C 8
873	Wolcott	C 3
627	Wolcottville	G 2
1,732	Worthington	D 6
833	Woodruff, Marion	E 5
840	Zionsville	E 4

the annual interest charge was $101,565. The bonded debt (1914) was $604,548, all domestic debt to State educational institutions.

Banks.— In 1914 there were 250 national banks with $21,450,000 of capital and $145,000,000 deposits; 365 State banks whose deposits were $78,443,762; five savings banks, with $12,864,355 of deposits; 141 loan and trust companies transacting bank business, with $75,387,001 of deposits and 199 private banks, which are not required to make returns by the State, having $25,762,876 deposits. The clearing-house organizations in the State are at Indianapolis, Evansville, Fort Wayne, South Bend, Gray and New Albany, and the earnings average about $600,000,000.

Education.— Indiana has always given much attention to education and especially since the adoption of the present school law in 1852. At that time there was created a public school fund, the interest on which was to be distributed to the various school districts. The principal factor in this was the profits which the State had derived from the State Bank of Indiana, amounting to about $3,500,000, to which was added $573,000 of the surplus revenue distributed by Congress in 1836, and several smaller funds. To this additions have been made by fines and other public receipts, until in 1914 the common school fund amounted to $11,677,456.65, in which is included the Congressional township fund, derived from the sale of school lands donated by the national government, amounting to $2,479,467.72. This total fund of $11,677,456.65 is held by the several counties, and the interest on it is applied to the support of the public schools. Added to this is a State tax of 13.6 cents on each $100, and 50 cents on each poll, the proceeds of State liquor licenses and dog licenses, and local taxes assessed by local authorities. From all these sources the actual revenues raised for the public schools in 1914 amounted to $17,322,994.03. The enumeration of children of school age — 6 to 21 years — was 766,383 (of whom 16,515 were colored). A large number of these attended private schools and the attendance in the public schools for the year was 441,168. The revenue was therefore nearly $40 to each child in attendance. There were employed 18,449 teachers, and the average number of days of school was, in townships 142, in towns 163, in cities 179, in the State at large 155. Owing to the concentration of schools, the number of school houses in the State has decreased more than 1,000 in the past 15 years, though their value has doubled, and the quality of accommodation has increased still more. In 1914 there were 38 concrete school buildings, 87 stone, 4,610 brick, 3,948 frame and 3 log. The value of buildings and apparatus was $49,224,882. In these figures are included 803 high schools, which are a part of the public school system. There are also a large number of private schools, notably those maintained by the Roman Catholics and Lutherans for children of all ages, and a number of academies, seminaries, institutes, boarding-schools, military institutions, colleges, normal schools, etc., for intermediate education.

There are three institutions of higher education that receive aid from the State, Indiana University at Bloomington, the State Normal School at Terre Haute, and Purdue University at Lafayette. Indiana University has an income of about $385,000 derived from a State tax levy and the interest on an endowment fund of $600,000 raised by State taxation. It has more than 2,000 students. The State Normal is also supported by a State levy of $192,000, and the city of Terre Haute pays one-half the expenses of keeping the buildings in repair. It has 3,049 students. Purdue has an income of $492,447 derived from State tax levy and interest on endowments, and including $57,000 paid to it annually by the United States government as an agricultural school. It has 1,867 students.

Among the private institutions for higher education the more important are Wabash College (Presbyterian), University of Notre Dame and Saint Meinrad's College (Roman Catholic), DePauw University (Methodist), Earlham College (Society of Friends), Franklin College (Baptist), Hanover College (Presbyterian), Northern Indiana Normal (non-sectarian), and the University of Indianapolis. The last named was formed by the union of Butler College (Christian) with the Medical College of Indiana, the Indiana Dental College, and the Indiana Law School, all of which are located at Indianapolis.

An important branch of educational work in Indiana is the development of libraries. A feature of the school system adopted in 1852 was the establishment of a free public library in each township in the State. The State expended $273,000 for books, and the system was received with great public favor, but no provision was made for maintaining or increasing the libraries, and in the pressure of the war times they were allowed very generally to fall into ruin. To some extent these have been replaced as school adjuncts by the libraries of the Young People's Reading Circle, which are found at many of the schoolhouses of the State. These libraries contain about 500,000 volumes. There has also been a notable development of town and city libraries, 138 towns having accepted donations from Andrew Carnegie, aggregating $2,097,000, agreeing to maintain libraries in the buildings thus provided. There are 33 others that are maintaining libraries in buildings provided by themselves. The general supervision of library work is lodged in the Public Library Commission, which has charge of a system of traveling libraries furnished by the State. It also maintains a school for the training of librarians engaged in the work in Indiana.

Churches.— The principal religious denominations of Indiana in the order of their strength are the Methodists, Roman Catholics, Disciples or Christians, Baptist, Presbyterians, United Brethren, and Lutherans.

Charitable and Penal Institutions.— The State maintains 10 charitable and six penal institutions, at an annual cost of over $1,500,000. Of the former five are hospitals for the insane located respectively at Indianapolis, Logansport, Richmond, Evansville and North Madison. These contain in varying numbers about 5,000 inmates. The annual cost of maintenance is about $1,025,000, or $205 per capita. The other charitable institutions are the School for the Blind, Indianapolis, inmates 121, per capita cost $358.96; School for the Deaf, Indianapolis, inmates 298, per capita cost $314; Soldiers' and Sailors' Orphans' Home, Knightstown, inmates 448, per capita cost $251; Soldiers Home, Lafayette, inmates 909, per capita cost $216;

School for Feeble-Minded, Fort Wayne, inmates 1,263, per capita cost $148; Village for Epileptics, New Castle, inmates 218, per capita cost $263.69; Tuberculosis Hospital, Rockville, inmates 119, per capita cost $468. The correctional institutions are the State Prison, Michigan City, inmates 1,158, per capita cost, $152, earnings, $67,438; Indiana Reformatory, Jeffersonville, inmates 1,004, per capita cost $208, earnings $82,568; Women's Prison, inmates 116, per capita cost $257, earnings $4,795; Girls' School, Clermont, inmates 288, per capita cost $278, earnings $119; Boys' School, Plainfield, inmates 552, per capita cost $215, earnings $939.

The legislature of 1913 made provision for a State farm, for male offenders not felons, and a tract of 1,584 acres was purchased near Putnamville, in Putnam County. In September 1915, there were 604 prisoners at the farm and the institution was recognized as on a successful footing. The Robert W. Long Hospital at Indianapolis, established under a bequest to the State by Doctor Long, was opened 15 June 1914. It has a State appropriation of $50,000 a year, in addition to receipts from pay patients. The State has the convict-contract-labor system, but the legislature of 1909 provided for its abolition in 1920. The convict labor is all done within the prisons. The State has the indeterminate sentence system with commutation of time for good behavior. In addition to the State institutions each county maintains a poor asylum. In these, and the Marion County asylum for the incurable insane, there is an annual population of about 3,500 inmates, of whom about two-thirds are men and one-third women. Of these inmates some are classed as insane and others feeble-minded. There are in the State 33 orphans' homes, in which there are annually about 1,800 inmates, of whom 1,300 are boys and 500 girls. At the same time the Board of State Charities reports 2,989 orphan children maintained in private homes, without public expense.

State Government.— The elective State offices are held for periods of two years, with eligibility restricted to four years in any period of six years, except as to the governor, lieutenant-governor and geologist, whose terms are four years. No one is eligible to the office of governor or lieutenant-governor for more than four years in any period of eight years. The governor's salary is $5,000, with an allowance of $1,800 for house rent. The governor's veto power extends to all laws passed by the legislature, but the veto may be overthrown by a majority vote in both houses. The legislature meets once in two years and may be called in special session by the governor; regular sessions are limited to 60 days and special sessions to 40 days. The Senate is composed of 50 members elected for four years each, and the house of 100 members elected for two years each. The members receive $6 a day while in session, and $5 for each 25 miles traveled in reaching the capital and returning home. The State is required to be redistricted for legislative purposes every six years. The present Constitution was adopted in 1851, and is very generally considered unsatisfactory, especially as to legislative representation and the location of the appointing power. It can be amended only by the majority vote of both houses of two consecutive legislatures, followed by a majority vote of the electors of the State.

Congressional Representation.— The State has 13 representatives in Congress.

Population and Divisions.— The population of Indiana territory in 1800 was 5,641, but only about 2,500 of this was within the boundaries of the State. In 1810 the population of the territory, with practically the same boundaries as the State, was 24,520. A territorial census taken in 1815 showed 63,897 inhabitants. After the admission of the State the census returns were as follows: 1820, 147,178; 1830, 343,031; 1840, 685,866; 1850, 988,416; 1860, 1,350,428; 1870, 1,680,637; 1880, 1,978,301; 1890, 2,192,404; 1900, 2,516,462. Of the population in 1900, 142,121 were foreign born, and 57,505 were negroes. The tendency of the negroes is to gather in the cities, more than one-fourth of the entire number being found at Indianapolis, and an eighth at Evansville. In 1910, 2,700,876.

The State has 92 counties, whose names and county-seats are as follows:

Adams, Decatur.	Lawrence, Bedford.
Allen, Ft. Wayne.	Madison, Anderson.
Bartholomew, Columbus.	Marion, Indianapolis.
Benton, Fowler.	Marshall, Plymouth.
Blackford, Hartford City.	Martin, Shoals.
Boone, Lebanon.	Miami, Peru.
Brown, Nashville.	Monroe, Bloomington.
Carroll, Delphi.	Montgomery, Crawfordsville.
Cass, Logansport.	Morgan, Martinsville.
Clark, Jeffersonville.	Newton, Kentland.
Clay, Brazil.	Noble, Albion.
Clinton, Frankfort.	Ohio, Rising Sun.
Crawford, English.	Orange, Paoli.
Daviess, Washington.	Owen, Spencer.
Dearborn, Lawrenceburg.	Parke, Rockville.
Decatur, Greensburg.	Perry, Cannelton.
Dekalb, Auburn.	Pike, Petersburg.
Delaware, Muncie.	Porter, Valparaiso.
Dubois, Jasper.	Posey, Mt. Vernon.
Elkhart, Goshen.	Pulaski, Winamac.
Fayette, Connersville.	Putnam, Greencastle.
Floyd, New Albany.	Randolph, Winchester.
Fountain, Covington.	Ripley, Versailles.
Franklin, Brookville.	Rush, Rushville.
Fulton, Rochester.	Scott, Scottsburg.
Gibson, Princeton.	Shelby, Shelbyville.
Grant, Marion.	Spencer, Rockport.
Greene, Bloomfield.	Starke, Knox.
Hamilton, Noblesville.	Steuben, Angola.
Hancock, Greenfield.	St. Joseph, South Bend.
Harrison, Corydon.	Sullivan, Sullivan.
Hendricks, Danville.	Switzerland, Vevay.
Henry, Newcastle.	Tippecanoe, Lafayette.
Howard, Kokomo.	Tipton, Tipton.
Huntington, Huntington.	Union, Liberty.
Jackson, Brownstown.	Vanderburg, Evansville.
Jasper, Rensselaer.	Vermilion, Newport.
Jay, Portland.	Vigo, Terre Haute.
Jefferson, Madison.	Wabash, Wabash.
Jennings, Vernon.	Warren, Williamsport.
Johnson, Franklin.	Warrick, Boonville.
Knox, Vincennes.	Washington, Salem.
Kosciusko, Warsaw.	Wayne, Richmond.
Lagrange, Lagrange.	Wells, Bluffton.
Lake, Crown Point.	White, Monticello.
Laporte, Laporte.	Whitley, Columbia City.

Chief Cities.— The largest city in Indiana is the capital, Indianapolis, with a population (1910) 233,650. Next in size are Evansville (69,647), Fort Wayne (63,933), Terre Haute (58,157), and South Bend (53,684). Each of these cities has a charter specially made for it, though under guise of a general law. These charters are of recent creation — the oldest made in 1891 — and establish advanced forms of city government. Of cities of secondary importance may be named Muncie (24,005), New Albany (20,629), Anderson (22,476), Richmond (22,324), Lafayette (20,081), Marion (19,359), Logansport (19,050), and Elkhart (19,282). There were in all 80 cities and 330 incorporated towns in the State in 1901.

State Capitol at Indianapolis

History.—The first-known visits of white men to Indiana were those of Sieur de la Salle, who followed the Ohio River along its southern boundary in 1669–70, and crossed its northwestern corner by way of the Saint Josephs-Kanakakee portage in 1671. There were no Indians living below the Wabash at that time and probably not many in the northern part of the State, but those there were LaSalle induced to join his confederacy against the Iroquois, and they all removed to the Illinois River, leaving Indiana practically uninhabited. After some years they began moving to the East, reaching Detroit by 1712, and shortly afterward located at points along the Maumee and Wabash rivers. The Delawares, who afterward lived in the central part of the State, on White River, came there about 1750. It is probable that the French first placed representatives at the Indian villages near the site of Fort Wayne, and next, about 1720, at Ouiatanon—on the north side of the Wabash just below Lafayette—and that there were stockade forts at these places, but there is nothing to indicate a permanent settlement at either place. The post at Vincennes was established in 1731, largely under the influence of Father De Beaubois, a Jesuit who had been stationed at Kaskaskia. Families located there soon afterward, and it remained a permanent settlement, though there is but one land grant recorded of date prior to 1736. The French posts were small and unimportant, and the history of the region under French and British rule presents no very striking features. In 1778 Vincennes was surrendered to representatives of Gen. George Roger Clark, and the Wabash country was brought under American control. A recapture by the British was followed by a second taking by Clark in 1779. The region was ceded to the United States by the treaty of 1783, and was included in the territory northwest of the Ohio River, by the ordinance of 1787. It was thus governed until 1800, when Indiana Territory was formed, including all of the Northwest Territory except Ohio. From Indiana Territory, Michigan Territory was cut off in 1805, and Illinois Territory in 1809, leaving it with practically the present State boundaries. By act of Congress of 19 April 1816, Indiana was authorized to form a State government, and the State was formally admitted by Act of 11 Dec. 1816. In the meantime a State Constitution had been adopted on 29 June; State officials had been elected, and the State government had been actually inaugurated on 7 November.

There was almost continuous Indian troubles in the Ohio Valley from 1788 to 1795, when, after General Wayne's successful expedition, peace was made at Fort Greenville. After that date the American immigration began and there was no material trouble with Indians until the formation of Tecumseh's confederacy in 1811. The Indians were overwhelmed at the battle of Tippecanoe (q.v.) on 7 November of that year, by the troops under General Harrison, and sued for peace, but when the war with England came on there were Indian hostilities of minor importance continuing until the close of the war in 1815. After that year there was a gradual extinction of Indian titles, the Indians being concentrated in the northern part of the State and finally removed west of the Mississippi. The last removals occurred in 1836 and 1838.

The sobriquet "Hoosier," commonly used to designate the State and its people, was first applied to them about 1830. It was not coined for that purpose, as is commonly supposed, but was a slang word signifying an uncouth rustic, which was in common use in the South at the time, and is still commonly used there in that sense.

The history of the State after its admission was chiefly that of peaceful development—clearing lands, opening roads, building towns and cities and establishing industries. The most notable feature was the disastrous internal improvement enterprise on which the State entered in 1836. It contemplated transportation routes on seven main lines, involving the construction of 1,289 miles of railroads and canals. That the routes were fairly well chosen is shown by the fact that they are now practically all occupied by successful railroad lines. The chief defect was that the improvements were mostly high-line canals, and the breaks in these before completion caused such great damage that the estimated cost was enormously increased. The financial panic of 1837 added to the difficulties, and the effects of this were aggravated by the general entering of the States on such enterprises on borrowed capital. The total debts of the several States swelled from about $13,000,000 in 1830 to $207,894,613 in 1842. In 1839 Indiana was unable to realize on the sales of her bonds, and was forced to default interest on those already issued. The canals and roads being unfinished, did not furnish the revenues anticipated. Compromises were effected by which the work done was turned over to creditors, but the State was left with a debt of about $10,000,000 without any property to represent it. In all, Indiana built 453 miles of canals, at a cost of $7,725,262, all of which are now abandoned so far as transportation is concerned. But under private management, and more favorable conditions, the transportation lines developed rapidly, and in 1849 the one railroad originally contemplated was paying 8½ per cent dividends on its stock. In 1860 there were 2,126 miles of railroads in successful operation in the State.

In the war with Mexico, Indiana furnished troops to the number of 4,470. Of these there were killed and wounded 183, and died of other causes 218. When the Civil War began the State occupied an important position, and its resources were utilized to the uttermost by its war governor, Oliver P. Morton. The State furnished 196,363 men for the war, and 784 paid for exemption, or in other words supplied 74.3 per cent of her total population capable of bearing arms, by the census of 1860. Only one State in the Union surpassed or equaled this record, Delaware being credited with 74.8 per cent of her military population. But of the supply credited to Delaware nearly one-tenth was in money commutation for exemption, and nearly one-tenth of the men in actual service was colored. On the basis of white troops furnished for three years or more of service, Indiana supplied 57 per cent of her military population of 1860, and on this basis was surpassed only by Kansas, which is credited with 59.4 per cent. Of the troops sent by Indiana 7,243 were killed or mortally wounded in battle, and 19,429 died of other causes, making a total death loss of over 13 per cent of all troops furnished. One feature of the war period in Indiana, and some

adjoining States, was the formation of secret treasonable societies known as Knights of the Golden Circle, and later Sons of Liberty. These attracted much attention at the time, and much comment later, but in reality they were neither extensive nor dangerous. They were organized with a system of "circles within circles," with mysterious rites and blood-curdling oaths, but the masses of the members understood that they were merely for mutual protection, and the treasonable designs were affairs of the inner circles. Among their members there were a number of government detectives who kept the authorities informed as to every movement, and at the final exposure the chief witness for the government was Felix Stidgers, a detective who had become so prominent in the order that he was made "Grand Secretary for Kentucky," and knew all of the secrets of the order. As is aptly stated by Governor Morton's biographer, "No one can read the history of the secret organizations in Indiana and not feel that, widespread as they were, there was not an instant in which they were not securely within the grasp of the war governor." After the war, Indiana became peculiarly a political battle-ground. In 1868 the Republicans elected Conrad Baker governor by less than 1,000 plurality, and in 1872 the Democrats elected Thomas A. Hendricks to that office by the narrow plurality of 1,148, although General Grant received the vote of the State for President. After 1872 neither party carried the State at two consecutive Presidential elections until after 1896, and neither carried it by a majority of all the votes cast, or by a plurality of as much as 20,000. One result of this close balance has been an improvement in State legislation, the Democrats leading in the legislature of 1889 which they held although they had lost the State offices and the Presidential vote of the State in the preceding year. Indiana in that year adopted the Australian ballot system, being the second State in the Union to do so, with some improvements that have been extensively copied. Other notable reform laws are a school-book law that has made a large reduction in the cost of books used in the common schools; a Board of State Charities law that has greatly improved the charitable and penal institutions of the State; a fee and salary law putting officials on salaries and requiring the payment of all fees into the public treasuries; a compulsory education law; laws for the encouragement of public libraries; laws for the incorporation of cities which provide the most modern modes of city government; laws for the reform of county and township government providing supervisory boards to which local legislation is entrusted, and a tax law that has been largely effective in equalizing taxation and has been copied elsewhere. Another feature of Indiana's development that has attracted notice in later years is its production of native writers of poetry and fiction. Among the former may be named Joaquin Miller, John Hay, William Vaughan Moody, John James Piatt and James Whitcomb Riley; among the latter Gen. Lew Wallace, Maurice Thompson, Edward Eggleston, Charles Major, Meredith Nicholson, Booth Tarkington, Elizabeth Miller (Hack) and Annie Fellows Johnston. There have also been many native writers in other lines of no mean ability.

The list of governors of Indiana is as follows:

TERRITORIAL		
William H. Harrison		1800–11
John Gibson		1811–13
Thomas Posey		1813–16
STATE		
Jonathan Jennings	Democrat-Republican.	1816–22
Ratliffe Boone (acting)	" "	1822
William Hendricks	" "	1822–25
James B. Ray	" "	1825–31
Noah Noble	" "	1831–37
David Wallace	Whig	1837–40
Samuel Bigger	"	1840–43
James Whitcomb	Democrat	1843–48
Paris C. Dunning (acting)	"	1848–49
Joseph A. Wright	"	1449–57
Ashbel P. Willard	"	1857–60
Abram A. Hammond (acting)	"	1860–61
Henry S. Lane	Republican	1861
Oliver P. Morton	"	1861–67
Conrad Baker	"	1867–73
Thomas A. Hendricks	Democrat	1873–77
James D. Williams	"	1877–80
Isaac P. Gray (acting)	"	1880–81
Albert G. Porter	Republican	1881–85
Isaac P. Gray	Democrat	1885–89
Alvin P. Hovey	Republican	1889–91
Ira J. Chase	"	1891–93
Claude Matthews	Democrat	1893–97
James A. Mount	Republican	1897–1901
Winfield T. Durbin	"	1901–05
J. Frank Hanly	"	1905–09
Thomas R. Marshall	Democrat	1909–13
Samuel M. Ralston	"	1913–17
James P. Goodrich	Republican	1917

JACOB PIATT DUNN,
Secretary of the Indiana Historical Society.

INDIANA UNIVERSITY, the State university located at Bloomington. In accordance with a provision of the State constitution, the legislature passed an act in 1820 providing for the establishment of a State seminary, which was opened in 1824 under the name of Indiana Seminary; in 1827, it was raised to the dignity of a college, and in 1838 the name was changed to Indiana University. In 1867 the university was opened to women, and has since been coeducational in all its departments. The university is the head of the public school system of Indiana, and no tuition fee is charged; the government is by a board of trustees which reports biennially to the governor. Courses are offered in languages, science and history, graduates receiving the degree of A.B. or B.S. The degrees of Ph.D. and A.M. are given for graduate work; there are also a school of law and a school of medicine connected with the university. There is a biological experiment station on Winona Lake, under university control, and a summer session is maintained. In 1915 the university reported: faculty, 113; students, 2,644; volumes in library, 101,000.

INDIANAPOLIS, Ind. capital of the State, county-seat of Marion County, the largest city in the State and the 22d in the United States; situated on the west fork of White River. It is 60 miles from the centre of population of the United States. It is the centre for 16 radiating railroads, which connect it with Chicago, 184 miles northwest, Cleveland, 283 miles northeast, Saint Louis, 240 miles southwest, Louisville, 110 miles south, Cincinnati, 111 miles southeast, Columbus, 181 miles east, New York, 819 miles east, and other termini in Ohio, Michigan, Illinois and Indiana. Its area is 39.45 square miles.

The site was selected in 1820 as the location of the capital by a legislative commission and

INDIANAPOLIS

Soldiers' Monument

its name was adopted by the legislature in session at Corydon, 6 Jan. 1821. The first plat included a square mile, which was laid out with broad rectangular streets and avenues radiating from a central circle. The character of the plan was undoubtedly influenced by l'Enfant, the designer of the city of Washington, D. C., for one of the surveyors who made the town plat had aided in the work at the national capital. While the additions to the city have not been developed upon the same broad lines, most of them have been treated liberally and the city is noted for its wide streets, well paved and beautifully shaded. The city is very level, nearly all of its area being 700 to 800 ft. above sea-level. There are 550.6 miles of platted streets, of which 255 miles are paved, 133 miles with asphalt, 80 miles with brick, 23 miles with wooden blocks and 12 miles with macadam. The chief business streets are Washington street, which is a section of the old National road projected and partly completed to run from Baltimore to Saint Louis; Market, Maryland and Georgia streets, all running east and west; Meridian, Pennsylvania, Delaware and Illinois streets, running north and south, and Massachusetts, Indiana, Virginia and Kentucky avenues, which are diagonals, radiating from the circular Monument Place. This central circle contains the State's monument to its soldiers and sailors, perhaps the most successful of the innumerable monuments erected by towns, cities, societies and states in commemoration of the nation's defenders, and generally regarded as one of the greatest in the world from an artistic point of view. The finest residence streets are Delaware, Meridian, Washington Boulevard, Maple Road and Pennsylvania. Several other residence districts are particularly well designed and cared for, such as Woodruff Place—a residence park, with esplanades, fountains, statues, etc.,—which has a town government of its own, though completely surrounded by the city; Morton Place, Meridian Heights and Irvington.

Public Service.—The first water supply and the first sewer system were constructed in 1870 to 1875 and but little else was done in the way of comprehensive public improvements until after the adoption of the present efficient charter in 1891. Prior to that year the city government had been by mayor and council. Public-spirited citizens who recognized the impossibility of securing comprehensive public improvements, through the Commercial Club agitated the adoption of the new charter, which separated the legislative and administrative functions of the city government, making the mayor and his appointees fully responsible for the latter. The first Board of Public Works devised a broad system of improvement, including sewerage, paving and street cleaning, which was supplemented in 1895 by a Park Commission. Under these two boards the progress in the establishment of municipal public works adding to the beauty and convenience of the city has been rapid. As a step preliminary to the era of improvement which began in 1890 a paving exposition was held for the purpose of educating the people of the city regarding paving materials and methods. It was the first ever held in America and attracted attention throughout the country. Official delegations were sent to it from about 500 cities. Prior to 1890 less than two miles of pavements had been laid. The amounts expended after the adoption of the new charter in 1891 to the year 1902, inclusive, were as follows: for pavements of asphalt, $2,726,668.01; brick, $1,011,214.39; wooden block, $969,652.82; macadam, $154,522.91; gravel, $757,112.50; for alley improvements, $46,655.26; for cement walks, $879,610.21; for brick walks, $65,995.41; making a total for paving of $6,611,431.51. The amounts expended up until 1 Jan. 1916, were as follows: for 133.13 miles of asphalt pavements, $5,217,493; for 80 miles of brick pavements, $2,550,409; for 23 miles of wood block pavements, $1,385,409; for 16.76 miles of bituminous concrete pavements, $583,039; for 8.58 miles of macadam pavements, $321,803; for 139 miles of gravel roadway, $1,593,311; for 467 miles of cement sidewalks, $2,267,990, and for 25 miles of brick sidewalks, $65,995, making a total of $13,985,000. The city has 377.78 miles of sewers which were constructed at a cost of $6,003,446.15. The grand total of expenditures for permanently improved highways, walks and sewers up until 1 Jan. 1916 was in excess of $20,000,000. The waterworks owned by the Indianapolis Water Company have been developed with the city. The system of pumping by direct pressure is used and a system of filter beds to purify the water taken from White River is operated in conjunction with the system of pumping from driven wells. The company maintains four pumping stations with a daily capacity of 110,000,000 gallons. The daily average pumpage for 1916 was 23,000,000 gallons. For fire service the company increases its pressure from 100 to 110 pounds. The company maintains 3,400 fire hydrants for the city at an annual rental of $45 each, or at a total cost of $153,000 a year. Electric lights are in general use, the household rates being 6½ cents per kilowatt hour. Open flame arcs of 500 candle power are used almost exclusively for street lighting, although the city maintains 700 gas lights of the boulevard type at an annual cost of $15 each. The total appropriation for street lighting for 1916 was $160,000 for which the city was rendered lighting service under contract as follows: 2,800 arcs at $41.98 a year each; 2,100 undergro nd-wired pedestal boulevard incandescents at $27.71 a year each; 100 overhead incandescents at $17.83 a year each and 700 gas boulevard lights, maintained by the city, at a cost of $15 a year each. The police department contains 435 men and is maintained at a cost of $511,771.47 a year. The police court, city clerk, detective and police departments are housed in a handsome building and the city and county maintain a workhouse where prisoners are sentenced for short terms. Four police substations are maintained. The fire department contains 360 men and costs for maintenance $478,407.68 a year. Thirty stations are maintained in addition to the new central fire station. The department has 76 pieces of apparatus as follows: 13 horse-drawn steamers; four combination motor pumps; eight motor hose wagons; 23 horse-drawn hose wagons; three horse-drawn chemical wagons; two motor squad wagons; five motor chiefs' cars; one tractor aerial truck; one tractor water tower; four motor service trucks; eight horse-drawn service trucks and two motor telegram repair wagons. The Indianapolis Salvage

Corps, financed by insurance companies, maintains two motor salvage squads that are operated in conjunction with the fire department. There are 75 miles of underground conduits used by the telephone, telegraph and electric light companies and 170 miles of street car lines owned by the Indianapolis Street Railway Company and operated under lease by the Indianapolis Traction and Terminal Company. The city is the most prominent interurban centre in the world. It has six interurban systems, made up of 13 lines, which in 1914 carried 7,912,763 passengers to and from the city, an average of 19,213 a day, 712 passenger cars being handled each day in the largest and most pretentious interurban station in the United States. Freight cars to the number of 23,500 are handled out of this station, owned by the Indianapolis Traction and Terminal Company, each year.

During the two-year period dating from 1914 to 1916 notable public improvements were either completed or under the process of construction. To eliminate such disasters as befell the city during the flood of 1913 a concrete flood prevention levee was constructed for more than a mile along the west bank of White River. The levee is 40 feet high and on the river side is faced with a concrete apron. On its crest is a 60-foot roadway, which makes a valuable addition to the city's boulevard system. This levee, which was financed under a special act of the Indiana General Assembly providing for the issuing of long term bonds, cost $1,350,000, and was completed in 1916. A movement to elevate the railroad tracks throughout the city was started by the Commercial Club Elevated Track Commission in 1894, and after 10 years of contention in courts and legislatures the work was begun. In 1914, at a cost of $1,000,000, the city made an immense sewer out of Pogues Run, a small stream running through the business district, that the tracks might be elevated successfully. Plans have been completed for track elevation and the work which will cost approximately $7,000,000 was well underway in 1916. It is expected that it will be completed in 1920.

Parks and Cemeteries.— The public park system includes 16 parks of 1,735.13 acres in area. Riverside Park, purchased in 1898, contains 934.6 acres and is valued at $1,277,000. Other parks, their area and estimated values follow: Fall Creek Parkway, 207.93 acres, $523,570; Garfield Park, 128.52 acres, $304,723; Brookside Park, 93.05 acres, $180,000; Pleasant Run Parkway, 93.48 acres, $180,000; White River Parkway, 45.55 acres, $82,000; Woollen's Garden, 44 acres, $50,000; Ellenberger Woods, 40.95 acres, $40,000; Brookside Parkway, 34.16 acres, $64,500; Rhodius Park, 33 acres, $47,000; Military Park, 17.3 acres, owned by the State of Indiana; Willard Park, 14.71 acres, $100,000; Burdsal Parkway, 11.49 acres, $43,000; Spades Place, 10.4 acres, $24,000; Greenlawn, eight acres, $60,000; University Square, four acres, owned by the State of Indiana; Highland Square, 3.98 acres, $25,000 and Saint Clair Square, three acres, owned by the State of Indiana. The total value of park land owned by the city is estimated at $2,981,293. The city street railway company owns two parks of unusual beauty a short distance from the city. Since the park commission was established in 1895 the city has expended $4,419,395.31 on park property, the sum of $1,299,435.82 having been expended in park maintenance; $1,586,863.39 for improvements and $1,533,096.10 for the acquisition of additional park property. The first cemetery of the the city, Greenlawn, has not been used as such for many years and is kept in park form by the board of park commissioners. Crown Hill cemetery, one of the notable cemeteries of the country, embraces over 540 acres. There are also Roman Catholic, Lutheran and Jewish cemeteries.

Notable Features of City.— It is in population, transportation facilities and volume of business transacted the largest inland city, not on a navigable body of water, in the United States. It has three direct steam roads to coal fields of Indiana. It has two direct roads to the Bedford or oolitic stone fields of Indiana; in the output of automobiles it is the second city of America and the Indianapolis Motor Speedway, a 2½-mile oval track paved with brick, is the greatest and first speed course of its kind in the world. The city has 200 wholesale and jobbing houses, representing all lines of trade. The Citizens' Gas Company, operating 550 miles of mains, provides the householder with fuel at 55 cents a thousand feet, the scale decreasing to 40 cents for large consumers. It has 25 modern office buildings and 63 hotels. A total of $60,000,000 worth of live stock is handled at the Indianapolis Stock Yards annually. The city is the centre for the manufacture of quartered oak veneer. An automatic telephone system was installed for the entire city in 1916.

Buildings.— The Indiana State House, costing $2,000,000, and built of Indiana oolite stone, is perhaps the most notable building. With its grounds it occupies two large blocks. The county building was completed in 1878 at a cost approximating $1,750,000. The Federal building, containing the post office, custom-house and United States courts cost $2,400,000. Other municipal buildings of note are the city hall, which cost $500,000, and the police building, the public library and some of the new public school buildings. Tomlinson Hall, a bequest by Dr. J. M. Tomlinson, is a public building, its lower story being used as a market. The Indianapolis Art Association owns an art museum and school. Notable among the city's business buildings are the Indiana National Bank, Fletcher Savings and Trust, the Merchants Bank, the Law building, the Lemcke, the Lemcke Annex, the Hume-Mansur, the Newton-Claypool, the Indiana Pythian building, the Odd Fellows building, the Meridian Life building, the State Life building, the Kahn building, the News building, the Occidental building, the Claypool, Severin and Washington Hotels, the Majestic building, the Indianapolis Board of Trade and the Indianapolis Chamber of Commerce buildings, the Murat Temple, containing the Murat Theatre, the Masonic Temple and the buildings occupied by the department stores of the William H. Block Company and L. S. Ayres & Company. During the five or six years prior to 1916, the city enjoyed an unprecedented building growth. Other buildings of large proportions are under process of construction. The Columbia Club building is an important feature of one quadrant of Monument Place, which surrounds the Indiana State

Soldiers and Sailors' monument. This massive shaft is the central and most notable decorative feature of the city. It is 285 feet high, including the bronze statue, and its base is ornamented with symbolic groups of statuary and reliefs in stone and bronze. It was designed by Bruno Schmitz and cost over $500,000. Four epochs in the history of the State are commemorated by the statues of George Rogers Clark, William Henry Harrison, James Whitcomb Riley and Oliver P. Morton, which are grouped about its base. The width of Washington street, 120 feet, and of the streets of the original plat, 80 and 90 feet, give space for the best possible display of architectural features. Plans were completed in 1918 by H. Van Buren Magonigle, architect, of New York, for an extensive educational centre on the former United States arsenal grounds of 76 acres, comprising 18 buildings, to include a stadium seating 29,000, an auditorium seating 9,000, high schools, industrial shops, etc., estimated to cost approximately $9,000,000.

Transportation.— Indianapolis is the centre of trade for the State. With the completion of the Indianapolis Southern Railway every county in the State except three, which are on the Ohio River, could be reached by railroad in less than one day's travel. Consolidations have placed most of the railroads in two systems. One of these, the Pennsylvania lines west of Pittsburgh, now operates the Madison and Jeffersonville lines, which reached the city in 1847, and the Vincennes line, completed in 1868; the Indiana Central to Columbus and the East, completed in 1853, and the Terre Haute and Richmond, later the Vandalia, completed in 1852, and now reaching Saint Louis; also a line to Chicago, partly over the Lake Erie and Western. The other, the Big Four system, operates the Bellefontaine road to Cleveland, completed in 1852; the Indianapolis and Cincinnati, which reached the city in 1850; the Indianapolis and Lafayette, of 1852, now reaching Chicago; the Indianapolis, Bloomington and Western to Peoria, finished in 1870, its eastern extension to Springfield, Ohio, completed about 15 years later; the Indianapolis and Saint Louis, completed in 1876. Through trains are also run to Benton Harbor, Mich., and to Louisville, over branches of these lines. The Cincinnati, Hamilton and Dayton Railroad Company operates the Cincinnati and Indianapolis Junction road, completed in 1868, and the Indianapolis, Decatur and Springfield road to Springfield, Ill. The Indianapolis, Cincinnati and Louisville operates a line to Chicago, which was completed about 1880. The Lake Erie and Western Railroad Company operates the old Peru and Indianapolis road, completed in 1854, and reaches Michigan City Toledo and Peoria.

These roads, which offer unusual facilities for handling both freight and passenger traffic, now are operated under 12 systems as follows: The Belt Railroad and Stock Yards Company; the Central Railroad of Indianapolis; the Chicago, Indianapolis and Louisville Railway Company; the Cincinnati, Hamilton & Dayton Railway Company; the Cincinnati, Indianapolis and Western Railway; the Cleveland, Cincinnati, Chicago and Saint Louis Railway; the Illinois Central Railroad; the Indianapolis Union Railway Company, which operates the "belt" or city switching system; the Lake Erie and Western; the Pennsylvania and Vandalia Lines; the Pittsburgh, Cincinnati, Chicago and Saint Louis Railway and the Vandalia Railroad Company.

The construction of the system of interurban roads began about 1890 with the Broad Ripple line, now a suburban line owned by the Union Traction Company of Indiana. The next to be constructed was the Indianapolis and Columbus line in 1900, now reaching Columbus. This line now is known as the Indianapolis, Columbus and Southern, has been extended to Louisville, Ky., and is operated by the lessees, the Interstate Public Service Company. It was followed quickly by the Indianapolis and Eastern, which now connects with Columbus, Ohio, and other eastern points. This line was extended to Terre Haute, and now is known as the Terre Haute, Indianapolis and Eastern. The Union Traction Company of Indiana entered the city from its centre in Anderson in 1901 and in 1903 completed a line north to Logansport, Tipton, and Kokomo, and other northern points. Lines entering the city in 1903 were the Indianapolis and Martinsville, the Indianapolis and Plainfield and the Indianapolis and Northern, extending to Crawfordsville and Lafayette. The Indianapolis and Cincinnati Traction line was completed east to Rushville in 1905 and since that time the line has been extended to Connersville. The right-of-way has been purchased to extend this line through to Cincinnati. This company also operates another line extending from Indianapolis to Shelbyville and Greensburg. The steam railroads are served within the city by the Union Railway Company owning the Union passenger station and the belt railway for facilitating the transfer of freight. The interurban electric roads are in like manner served by the Indianapolis Terminal and Traction Company owning a large terminal station and belt lines for passenger and freight business.

Manufactures.— During the brief natural gas era in Indiana, Indianapolis benefited largely by the cheap fuel. Since the failure of the gas supply the superior shipping facilities of the city and cheap coal fuel have attracted many more manufactories, and more than 160 industries are carried on in about 2,000 establishments. According to United States statistics covering business conditions in the city during 1916 the capital invested in 887 manufacturing establishments was $87,724,000, or an average capital of $99,000. The cost of the material used in all of the establishments during the year was $91,432,000, or an average cost of $98,000. The value of products manufactured in the city during 1916 was $140,346,000 or an average per establishment of $158,000. The number of employees was given as 37,956; the number of proprietors and firm members, 554, and the number of horsepower in operation, 65,266. Among the most important industries are slaughtering and meat packing; pharmaceutical and biological products; iron work; automobiles and accessories; carriages and wagons and material therefor; iron work of all kinds; furniture; malt liquors; printing and bookbinding; clothing; veneers; saws and lumber and lumber mill products.

Finances and Banking.— The assessed valuation of the city in 1870 was $24,656,460. In 1891 at the beginning of the era of public improvements it was $93,595,930, and in 1915 it

had increased to $244,217,280. The tax rate for State, county, township, city and school purposes was $2.53 in 1915. The net public debt was $4,602,500. The city's expenses for 1915, including money spent for track elevation and flood prevention, were $4,390,484.29. The postal receipts for 1915 were $1,631,795.52. The value of imports for 1915 was $535,821 and the total customs receipts were $262,603.57. The city has a total of 27 national banks, State banks and trust companies with total resources amounting to $111,823,921.44. It has six national banks with capital and surplus amounting to $9,700,000; 12 State banks with capital and surplus amounting to $606,900, and 9 trust companies with a capital and surplus of $6,000,000, the total capital and surplus of these institutions being $16,403,554. The deposits in the national and State banks aggregated in 1918 $50,000,000, while the savings deposited with trust companies amount to $22,904,453.60. There are about 90 building, loan and savings associations in various stages of progress and liquidation.

Churches.—Indianapolis is the seat of a Roman Catholic bishop, with an auxiliary bishop, and of an Episcopal bishop. Including missions there are 17 Roman Catholic churches in the city, 52 Methodist, 20 Presbyterian, 7 Episcopal, 54 Baptist, 5 Congregational, 9 Lutheran, 20 Christian, 4 German Evangelical, 3 Evangelical Association, 3 Friends, 3 United Presbyterian, 5 German Reformed and 71 of other denominations. There are 7 Hebrew congregations.

Charities.—In the city there are 15 hospitals, State, county, college, church, charitable and private, 4 homes for the aged, 10 industrial schools and orphan asylums, 4 homes for women and girls, more than 60 organized charitable and relief societies, and such institutions as the Red Cross, Y. M. C. A., Y. W. C. A., Friendly Inn, Humane Society, Day Nursery. The township trustee is a source of official relief. The charities of the city are efficiently administered, as a result of co-operation between organizations largely brought about through the efforts of Rev. Oscar C. McCullouch. In 1894 a plan of relief for the unemployed, whereby over 5,000 people were provided with the necessaries of life throughout winter without pauperizing influences resulting, became widely known as the "Indianapolis Plan of Relief." The plan was devised and carried out on behalf of the people of the city by a Commercial Club committee composed of Hugh H. Hanna, Col. Eli Lilly and William Fortune. In 1918 a fund of approximately $3,000,000 was raised by voluntary contributions for purposes of war relief and local charities, to be disbursed under the authority of the War Chest Board of Indianapolis. This board in 1918 undertook with the assistance of experts to reorganize the philanthropic work of the community under plans for centralized direction.

Education.—There are 80 public school buildings, including 3 high schools, one giving manual training, in which about 1,000 teachers are employed, with a total enrolment of about 45,000 pupils; 28 Catholic schools, 2 Lutheran schools, 25 private schools and academies, besides the schools in connection with institutions. The city is the home of several institutions of importance, Butler College, supported by the Christian Church, and the Indian University School of Medicine being among these. Other important schools are the Benjamin Harrison Law School, the Indiana Law School, the Indiana Dental College, and a large number of business, music and art schools. In addition there are several girls' schools supported by private funds or by religious denominations. Free kindergartens are operated under the Free Kindergarten Association, and 51 kindergartens and a normal school are maintained largely from public funds, besides a number of private kindergartens. The Art Association of Indianapolis maintains the John Herron Art Institute, including art gallery, school and museum. The Propylæum is a building erected by an association composed exclusively of women.

Libraries.—The most notable libraries are the public library with about 200,000 volumes, under the control of the board of school commissioners, and the State library with about 75,000 volumes. The State law library with 50,000 volumes, and agricultural and horticultural libraries in the State House, and the county library and bar association's library in the court-house may be noted. There are 12 branches of the public library and many small special libraries of schools and associations.

Newspapers and Literature.—Indianapolis has 7 daily papers, 23 weeklies, 38 monthlies, a total of 72 publications of all classes. The list of trade and class papers published in the city is particularly notable. Indianapolis is the home of many writers whose names are familiar to the public, notable among whom are James Whitcomb Riley, Booth Tarkington and Meredith Nicholson. In recent years Indianapolis has become an important western book-publishing centre.

Organziations.—The development of the city has been markedly influenced by organized work in various directions. There are a great number of literary, art and musical societies, and largely as a result of this activity there is a high standard of cultivation in such matters. This has had a notable influence in establishing in the social life of the city a standard of merit rather than determining the standing of the individual on questions of lineage or wealth. There are many social clubs, among the most notable being the University, Country, Woodstock, Dramatic, Contemporary and Woodruff Clubs, the Athæneum and the Männerchor, while the Columbia, Marion and Indiana Democratic Clubs are political organizations, established in comfortable homes. The Columbia Club building, located on the Circle, is one of the finest club-houses in the United States. The Commercial Club, now the Chamber of Commerce, with a membership of over 2,500, which owns as its home an eight-story office building, was a dominant force in the new era of progress and development which started in 1890, and devotes itself to the welfare of the city. The Board of Trade, an older organization with a membership of about 700, has also been active in this direction. The Red Cross has a membership of over 100,000 in Indianapolis, and expended more than $1,000,000 in 1917–18. Organizations of various kinds, commercial, trade, fraternal, social, literary, art, musical and miscellaneous, number over 1,000.

Government.—All city elective or appointive

officers hold a four-year term of office. The administrative department is in the hands of the mayor and the boards and officials appointed by him. The city council consists of nine members, one being elected from each of the six councilmanic districts, and three at large. The council is composed of six members representing the party in power and three members of the next largest political party. The city clerk and police judge also are elected for four-year terms. The mayor's appointees are the corporation counsel, the city controller, the chief of police, the fire chief, three members of the board of public works, the three members of the board of public safety, the four members of the board of park commissioners, and four members of the city board of health. Other city officials, serving in departments subsidiary to those set forth above, are appointed by the mayor through the boards having the supervision of these departments. The board of school commissioners consists of five members elected by popular vote. The board is non-partisan, women being eligible to membership. The affairs of the school city are separate from .those of the municipality proper, the board having control over its finances, which are provided by special tax levies under State law. Notable improvements in methods of municipal administration are in progress, as a result of a survey and recommendations of the New York Bureau of Municipal Research, made under the direction of the Chamber of Commerce in 1917 and the establishment by the Chamber of a Municipal Bureau in 1918.

Population.— Beginning with two or three families in 1819 or 1820, Indianapolis has shown a steady and rapid growth, having a population of 1,085 in 1830; 2,698 in 1840; 8,091 in 1850; 18,611 in 1860; 48,244 in 1870; 75,056 in 1880; 105,436 in 1890; and 169,164 in 1900. Since 1900 the increase in population has been still more rapid, the census of 1910 showing a population of 233,650, making an increase of 38.1 per cent over the figures given in the last official enumeration. The population in 1916 was estimated as 285,000; in 1918 at more than 300,000. In 1890 Indianapolis was 26th in population, and in 1910 it was 22d in the United States.

History.— The first settler, George Pogue, arrived in March of 1819 or 1820. The legislature of Indiana, meeting at Corydon, by committee selected, in 1820, the site for a State capital, and named it Indianapolis, 6 Jan. 1821. Another committee laid out the plat. Lots were slowly sold for several years, and the government was actually removed to the new capital in 1824, the first session of the legislature being held there in 1825. The first State House, modeled after the Parthenon, was completed in 1835. A town government was instituted in 1832 under three trustees, a town council was established in 1838, and a city government under mayor and council in 1847. The present metropolitan form of government, with the mayor as the responsible administrative officer and the council as the legislative branch, was adopted in 1891. A volunteer fire department was formed in 1826, which had much help from the State when the capitol building was completed. The first fire chief was appointed in 1853, and the department was changed to a corps of paid men in 1859. The police department was first established in 1854. The new town began to support a newspaper in January 1822, and a church in 1823. The first railroad reached the city in 1847, and several others were completed in the next four years. Their effect upon the town is seen in the large increase in population. The State capital was the centre of great activity during the War, and there was great expansion in business and manufactures as well as increase in population, most of which was retained. The city did its full share in raising regiments for the War, and is said to have expended a million dollars in contributions, bounties, and war expenses. Camp Morton, on its outskirts, was first a camp for training soldiers, and later for prisoners of war. The free school system now cited as a model by educational experts, was begun in 1853 with the accumulations of several years of special taxation spent in buildings and grounds. The Citizens' Street Railway charter was granted 18 Jan. 1864. The slaughtering and packing business, now so large a factor in the city's trade, began its great expansion in the same year. Public improvements were but few in number until the adoption of the new charter in 1891.

Indianapolis has numbered among her prominent citizens Benjamin Harrison, Thomas A. Hendricks, Charles W. Fairbanks, Thomas R. Marshall and others high in the affairs of the government.

WILLIAM FORTUNE,
President Indianapolis Chamber of Commerce.

INDIANOLA, Iowa, city and county-seat of Warren County, 18 miles south of Des Moines, on the Chicago, Burlington and Quincy and the Chicago, Rock Island and Pacific railroads. A large and increasing trade in grain, butter, eggs, fruit, live stock and garden products is carried on. The Simpson Methodist Episcopal College was established here in 1867. The electric light plant and waterworks are owned by the city. Pop. 3,500.

INDIANS, American. Columbus, when he discovered America, believed he had reached a part of Asia or of India, and in a letter of February 1493 wrote of "the *Indians* (in Spanish, *Indios*) I have with me." Thus the aborigines of the New World came to be called "Indians" (French *Indiens,* German *Indianer,* etc.), or, to avoid confusion with the natives of India, "American Indians," for which rather cumbrous term the word "Amerinds," susceptible of many modifications by means of prefix and suffix, and easily adaptable to the exigencies of modern European and other civilized languages, has been suggested by an eminent American lexicographer and is used more or less by a number of anthropologists and other writers. The word "American," originally applied to the Indians, is still somewhat in use, and Dr. D. G. Brinton styled his comprehensive sketch published in 1891, 'The American Race'; but its employment to designate the white population of the continent seems to bar its ethnological application to the aborigines without some qualifying term. By some writers the Indians are called the "Red Race," and, more popularly, "Redskins" (in French *Peaux-Rouges,* in German *Rothäute*), or "Redmen," terms of no exact somatic significance. A few American

and many European ethnologists continue to separate the peoples who created the civilizations of Mexico, Central America, Peru, etc., from the Indians, while others, exclude the Eskimo, and others, again, the "Mound-Builders." But somatic, cultural and linguistic evidence justifies the conclusions of Powell and Brinton in using the term "American Indians" to include not only the aborigines now existing, or known to have existed since the discovery, but also all the pre-Columbian peoples of America concerning whom we have little data — the most divergent are no more than sub-varieties of American man. This unity is the great ethnic phenomenon of American aboriginal history. The study of Indian languages, archæological remains, arts and industries, games, social and religious institutions, mythology and folk-lore indicates a general psychic unity, while the somatic diversities do not transcend those observable in the other great races of mankind. Whether one investigates, as McGee has so admirably done, the Seri of the Gulf of California, who represent about the lowest type of savage culture on the North American continent, or the Mayas of Yucatan, whose approach to a phonetic system of writing touches the high-water mark of Amerindian achievement, one receives the same impression: that it is a question not of very recent civilized or semi-barbaric intruders from Asia or from Europe, but of a race (whatever their remoter origins may be) who have dwelt for ages in an American environment, which has shaped them into the peoples met with by the whites at the time of Columbus' discovery. The limited effect of the "discovery" of the Norsemen may be held to discount any "discoveries" by Europeans before them; while, on the other hand, the American-Asiatic contact revealed by the investigations of the Jesup North Pacific expedition is as much American as Asiatic, and the "Bering Sea" culture is a local phenomenon no more fundamentally indigenous to the Old World than to the New. The arguments in favor of a trans-Pacific Malayo-Polynesian influence upon primitive America are no stronger than those that can be adduced to support the contrary opinion. The culture of the "Mound-Builders" does not in any way transcend the possibilities of what the American Indian was and is yet capable of, nor is it necessary to assume the presence of foreign culture-elements to explain the civilization of Mexico, Yucatan, Colombia and Peru. Since very primitive times America has been essentially the "ethnic island" of Brinton, Keane and other investigators. The impress of America has been upon the aborigines so long that physically, socially, linguistically they have been "Americanized" in so marked a fashion that their right to be considered one of the "races" of mankind is not to be dismissed without cause. To group them merely as a branch of the Mongolian, or, again, of the Malay "race," is to obscure many points of great importance in the prehistory of America or to ignore them altogether. The American Indian is in too many respects a modified (and anciently so) variety of mankind to be thought of as expressing in any serious degree the type of the Mongolian or the Malay.

Language and Culture.— The ethnic isolation of the American race has already been noticed. The apparent independence of the culture-centres of North and South America is another interesting fact. With the exception of a few possible traces of the presence of tribes of Arawak lineage in ancient Florida and the spread of art-*motifs* of the Caribbean type over a portion of the adjacent Gulf region, no direct evidence of the influence of South America upon North American culture is forthcoming. The independent origin of Mexican and Peruvian civilizations seems certain, and convincing proofs of the community of origin of Peruvian and Chibchan and even of Mexican and Mayan are lacking. The possibility of inter-cultural relations having once existed is, however, not to be denied. The Pacific coast, from the Gulf of California to the Argentine and Chile, has been a nursery of culture just as the Mediterranean area was for the Eurafrican peoples. There has been a Mexico and a "greater Mexico," a Peru and a "greater Peru," while the Mayas and the Chibchas have also had their extensive spheres of influence. To the Pueblo culture north of Mexico corresponds the Calchaqui culture south of Peru. On the northern borders of Mexico still lie the savage Seri and Yaqui, and the culture areas of Colombia and Peru have also their primitive frontages — and this was so in the time of the ancient Montezumas and the Incas. This juxtaposition of civilization and savagery is one of the characteristic facts of American ethnology, as it was once likewise of the history of the Mediterranean area in the Old World. In both areas we meet with a large number of peoples who rose above savagery, but, for some reason or other, failed to develop high stages of culture. That the more material evidences of civilization should be so confined to the Pacific coast is, to some writers, a significant fact suggestive of Asiatic relations; but the intellectual power of such Atlantic peoples as the Iroquois and some of the Muskhogean tribes of North America, and the moderate but distinct progress made by a few of the Brazilian tribes of the Atlantic area relieve us from any such theory, environment and historical incident in America quite sufficing to account for the phenomena involved. (See ETHNOLOGY). Certain other resemblances and contrasts in the various aspects of aboriginal culture in America merit attention here. At the extreme north of the continent, one stock, the Eskimo, with closely related forms of speech, kindred mythology and folk-lore, similar customs and social institutions, etc., extends in a narrow line from east to west, even overflowing into Asia, while at the extreme south (much less extensive) the Fuegians, numbering altogether less than 10,000, are divided into three distinct linguistic stocks (Yahgans, Onas, Alikulufs). Eastern and northern North America and the corresponding regions in South America are areas of wide distributions of single stock. The Pacific Coast of America, as compared with the Atlantic, is a place where, in diverse spots, languages seem to pullulate. This region (including the narrow limits of Mexico and Central America) contained probably more independent tongues than all the rest of the continent. Indeed, within the present bounds of the State of California alone 22 such tongues are found, with several others in Nevada, and in Prof. Cyrus

Thomas' list of the stocks of Mexico and Central America, made in 1902, nearly 30 are recognized.

The multiplicity of languages in primitive America has called forth explanatory theories of various sorts, among them Horatio Hale's suggestion of the origin of linguistic diversity through the spontaneous language activity of the child. As Gatschet has noted, the very existence of such a multitude of tongues all over America is proof that neither in ancient nor in later times has this continent been the scene, on a vast scale, of the suppression and extermination of peoples one by the other, which have been characteristic features of Old World history. In spite of the common belief to the contrary, mutual destruction was probably never so rife as when the coming of the white man introduced new means of warfare, and, crowding the natives for subsistence, led them to attack each other more effectively. The recent studies of Dixon and Kroeber in California have strengthened the view of a certain parallelism of language and culture.

That some culture-elements, however, have spread from tribe to tribe is shown by the distribution of certain inventions discussed by Mason, the northward movement of such plants as maize, the use of tobacco, the transmission of many themes and incidents of myths and legends (as demonstrated by Boas), the modes of occurrence of certain art-forms, etc. Interminglings of culture of a more or less local, though often of an extensive, character, have taken place in the Bering Sea area, in the Columbia River region, in the habitat of the Pueblo Indians of New Mexico and Arizona, in the southeastern part of the United States, in the Isthmian region of Central America, in Ecuador, in the Pampean country of the Argentine, etc.— larger and more significant intermixtures have, perhaps, taken place in earlier times in Mexico, the Mayan country, Colombia and Peru. A number of the borrowed culture-elements may be explained as the result of trade and commerce, by means of which useful or artistic objects, food, plants, etc., were easily conveyed long distances under primitive conditions. The widespread custom of adoption would also account for not a few instances of alien culture-grafts. So, too, with the exogamic marriage, when the women are culture-bearers. Where language-mixture has taken place it is more or less easily detectable in most American Indian stocks and tongues. When families of the same stock possess, in the one case (Algonkian), dialects which differ as much as Micmac and Blackfoot, in the other (Iroquoian), as much as Cherokee and Mohawk, we are justified in looking for culture-differences as well in such widely separated peoples. Doubtless the results of careful somatological, sociological and other investigations of the various tribes of American aborigines will furnish us ultimately with diverse ways of classifying them. At present, however, the most serviceable classification is a linguistic one, the result of the labors of Major J. W. Powell and the Bureau of American Ethnology, supplemented by the work of Dr. D. G. Brinton.

Linguistic Stocks.— The Bureau of American Ethnology has issued the Powell map showing the extent of the 58 linguistic stocks north of the Mexican boundary line; that is, of families or forms of speech, so independent of one another as to be catalogued as distinct stocks; apparently no more closely related than the Aryan and the Semitic families of the Old World. For South America no such authoritative map is extant. The exact number of such linguistic stocks in America has not yet been determined with certainty, but the following list probably represents the best view of the matter to-day:

1. Adaizan (Louisiana)
2. Algonkian (northeast North America)
3. Alikulufan (Tierra del Fuego)
4. Andaquian (Colombia)
5. Arauan (northwest Brazil)
6. Araucanian or Aucan (Chile)
7. Arawakan (Central and N. E. South America)
8. Atacameñan (S. Bolivia)
9. Athapascan (N. W. Canada, etc.)
10. Attacapan (Louisiana)
11. Aymaran (S. Peru, N. Bolivia)
12. Barbacoan (S. Colombia)
13. Beothukan (Newfoundland)
14. Betoyan (Colombia-Venezuela)
15. Caddoan (Texas)
16. Calchaquian or Catamarcñan (N. Bolivia)
17. Canichanan or Canisianan (N. Bolivia)
18. Carajan (S. Brazil)
19. Cariban (N. E. South America)
20. Cayubaban (N. Bolivia)
21. Charruan (N. E. Argentine)
22. Chetimachan (Louisiana)
23. Chiapanecan (Central America)
24. Chibchan (Colombia and Isthmian region)
25. Chimakuan (Washington)
26. Chimarikan (California)
27. Chinantecan (Oaxaca, Mexico)
28. Chinookan (Washington)
29. Chiquitan (N. Bolivia)
30. Chocoan (N. W. Colombia and Isthmus)
31. Chumashan (California)
32. Churoyan (Colombia-Venezuela)
33. Coahuiltecan (Mexico-Texas, mouth of Rio Grande)
34. Coconucan (S. Colombia)
35. Copehan (California)
36. Costanoan (California)
37. Cunan (Isthmus of Panama)
38. Doraskean or Changuinan (Panama and Nicaragua)
39. Eskimoan (Northern fringe of North America)
40. Esselenian (California)
41. Guahiban (Venezuela)
42. Guaraunian (Venezuela)
43. Guaycuruan (Gran Chaco, Paraguay-Bolivia)
44. Huavean (Isthmus of Tehuantepec)
45. Iroquoian (Ontario-Erie region, with offshoot in S. E. United States)
46. Itonaman (Bolivia)
47. Jivaroan (Peru, Ecuador)
48. Kalapooian (Oregon)
49. Karankawan (Texas)
50. Kechuan or Quechuan (Peru)
51. Keresan (New Mexico, Pueblos)
52. Kiowan (Nebraska-Wyoming)
53. Kitunahan (S. E. British Columbia, N. Idaho)
54. Koloschan (Alaska)
55. Kulanapan (California)
56. Kusan (Oregon
57. Laman (Peru)
58. Lencan (Central America)
59. Lulean (Gran Chaco)
60. Lutuamian (Oregon)
61. Mainan (Ecuador, N. W. Brazil)
62. Mariposan (California)
63. Matacoan (Gran Chaco)
64. Matagalpan (Nicaragua)
65. Mayan (Yucatan, Chiapas, Guatemala, etc.)
66. Mocoan (Colombia)
67. Moquelumnian (California)
68. Mosateñan (Bolivia)
69. Moviman (Bolivia)
70. Muskhogean (S. E. United States)
71. Natchezan (Louisiana)
72. Onan (Tierra del Fuego)
73. Otomian (Central Mexico)
74. Otomacan (Venezuela-Colombia)
75. Palaihnihan (California)
76. Paniquitan (Colombia)
77. Panoan (Peru)
78. Payaguan (Gran Chaco)
79. Payan (Honduras)
80. Peban (Peru)
81. Piman (S. Arizona, N. W. Mexico)
82. Piaroan (Colombia-Venezuela)
83. Puinavan (Colombia-Venezuela)
84. Pujunan (California)
85. Puquinan (Peru)
86. Quoratean (California)
87. Salivan (Colombia-Venezuela)
88. Salinan (California)
89. Salishan (British Columbia, etc., to the south)
90. Samucuan (S. Bolivia)
91. Sastean (California)
92. Serian (N. W. Mexico)
93. Shahaptian (Oregon-Idaho)
94. Shoshonean or Uto-Aztecan
95. Siouan (Carolinas and Missouri Valley)
96. Skittagetan (Q. Charlotte Is.)
97. Subtiaban (Nicaragua)
98. Tacanan (Bolivia)
99. Takilman (Oregon)

100. Tañoan (New Mexico, Pueblos)
101. Tapuyan (S. Central Brazil)
102. Tarascan (Michoacan, Mexico)
103. Tequistlatecan (Oaxaca, Mexico)
104. Ticunan (N. W. Brazil)
105. Timotean (Venezuela)
106. Timuquanan (Florida)
107. Tonikan (Louisiana-Mississippi)
108. Tonkawan (N. W. Texas)
109. Totonacan (Vera Cruz, Mexico)
110. Tsimshian (British Columbia)
111. Tsonekan (Patagonia)
112. Tupian (E. Central Brazil)
113. Uchean (Georgia)
114. Ulvan (Nicaragua)
115. Waiilatpuan (Oregon)
116. Wakashan or Kwakiutl-Nootka (British Columbia)
117. Washoan (Nevada-California)
118. Weitspekan (California)
119. Wishoskan (California)
120. Xicaquean (Honduras)
121. Xincan (Guatemala)
122. Yahganan (Tierra del Fuego)
123. Yakonan (Oregon)
124. Yanan (California)
125. Yaruran (Venezuela)
126. Yukian (California)
127. Yuman (Lower California, Arizona)
128. Yucan (Peru)
129. Yurucarean (Bolivia)
130. Zaparoan (N. W. Brazil)
131. Zapotecan (S. E. Mexico)
132. Zoquean (S. E. Mexico)
133. Zuñian (New Mexico)

Of the stocks enumerated, 51 belong to South America and 56 to North America north of Mexico. The status of investigation is such that the number assigned to South America is approximate only, and may ultimately be considerably increased or reduced. Some stocks, like the Adaizan, Beothukan (exterminated by whites), Chetimachan, and a few of the minor stocks in South America, are extinct or nearly so. A goodly number — including, for example, many of the stocks on the northwest Pacific Coast, the Texas-Louisiana country, parts of Central America and the Pacific region of South America — were or are of limited area; others, like the Eskimoan, Athapascan, Algonkian, Siouan, Shoshonean, Arawakan, Cariban, Tupian, etc., are noteworthy by reason of the extent of their domain. Some, like the Kootenay, consist of practically a single language, while others, like the Algonkian, Siouan, Athapascan, Salishan, Aztecan, Mayan, Arawakan, Tupian, Cariban, etc., have developed numerous dialects, sometimes only remotely resembling the mother tongue. Doubtless, with the perfection of linguistic research, some changes will be made in the list of stocks or perhaps a method of groups may be devised in which stocks showing certain resemblances other than those of a lexical nature may be classed together. The studies of Dixon and Kroeber indicate the possibility of this for the numerous Californian stocks, and a similar result may be predicted for certain other regions of the continent. As said, all the American Indian stocks are far from being of the same significance, many of them having hardly any historical importance. A few words about some of the most typical and most important must suffice here.

North American Stocks.— The Eskimoan stock is noteworthy by reason of being the first of all the aboriginal peoples of America to be visited by representatives of European culture — the Norsemen in the 10th century, etc. It is also the only primitive people who, unaided by civilized races, occupy a portion of both hemispheres, for the Eskimo stretch from Labrador to a considerable distance within the borders of northeastern Asia. They illustrate the victory of man over a difficult environment, for they are a merry and sociable people in spite of the inclement and depressing character of their Arctic surroundings. They have also a marked sense of humor, as the institution of nith-song, or settlement of disputes by public judgment of the comparative merits of the two parties in competitive singing would indicate — the themes of the singing being the dispute and sarcasm at the expense of the opponent. The Eskimo are also very skilful carvers and engravers of ivory, their spirited drawings of animals, etc., resembling in marked fashion the similar art-products of prehistoric man of the French river-drift, a likeness which has induced some authorities (Dawkins, De Mortillet) to assume a racial connection between these two peoples. Mason has recently suggested that these drawings owe a good deal to the contact with Europeans (introduction of iron tools, etc.), but Boas considers that their close resemblance to the bark and rock pictographs of the Indians forbids the conclusion that these drawings are of other than native origin. The unity of language and (to a considerable degree) of custom, mythology, etc., among the various Eskimo tribes is remarkable when one remembers the extent of their distribution. The use of the Eskimo dog with the sledge, the kayak, the harpoon, the snow-house (iglu) and the invention of many mechanical devices, show them to be gifted with native intelligence.

The Athapascan stock is notable for the contrasts in culture and diversities of culture-capacity presented by its members. Some of the Athapascan peoples of northwestern Canada and Alaska are among the lowest types of American man, and a few of them have hardly yet come to knowledge of the white man, the advent of the fur-trader being, according to J. M. Bell, a matter of the last few years in part of their domain. To this stock belong also the Apaches, once the terror of the civilization of the Southwest, whose depredations, in earlier times, disturbed the peace of the native civilization of Old Mexico. It is fair to say, however, of them that individual Apaches (Dr. Montezuma, for example) show good capacity for adopting the chief elements of white American culture. Several small tribes of Athapascans are scattered through Washington, Oregon and California, the most noteworthy being the Hupa, on Trinity River, the "Romans of California," as they have been called. The Navaho, who have assimilated to a considerable extent the culture of the whites, were good agriculturists before the coming of the Spaniards, from whom they adopted the sheep, a fact which modified their environment and their response to it. The contrast between the rude tribes of the "Barren Grounds" of Canada and the Navaho of New Mexico and Arizona is, as Horatio Hale pointed out, one of the most remarkable instances of culture-change by process of environmental variation on record. The recent loan-word *Klondike* comes from an Athapascan dialect.

The Algonkian stock, members of which were found from Labrador to South Carolina, and from the confluence of the Ohio and Mississippi northwesterly to the foot of the Rocky Mountains and the borders of the domain of the Athapascans, is of interest for many reasons. The great area over which it is spread has brought members of this stock into contact with many other Indian peoples,— the Naskopi, Crees, and northern Ojibwa with the Eskimo; the Micmacs with the Eskimo and

1. Labrador Eskimo Woman. 2. Mexican of the coast. 3. Mexican of the highlands. 4. Yucatan Indian Woman. 5. Ecuador Indian. 6. Peruvian Indian. 7. Brazilian Indian (Ipurina). 8. Dakota (Sioux) Indian. 9, 10. Apache. 11. Bellacoola (N. W. Coast). 12, 13. Pueblo Indians (New Mexico). 14, 15. Indians of Zapoteca, Mexico. 16. Bororó. 17. Caraja. 18. Botocudo. 19. Umaua or Omagua (16-19 of Brazil). 20. Araucanian (Chile). 21, 22. Indians of Tierra del Fuego, with a child. 23. Patagonian.

Beothuk; the Ojibwa and related tribes of New England, New York and Pennsylvania, the Lenâpé of New Jersey, the Nanticokes, Powhatans, etc., of Maryland, Virginia and the Carolinas with the Iroquois (who, both north and south, form an *enclave* in the Algonkian territory); the western Ojibwa, etc., with the Siouan tribes in the upper Mississippi region, and in the southern Mississippi country the Illinois and kindred peoples with the Caddoan and other stocks; the Blackfoot in the extreme northwest of the Algonkian area with the Athapascan Sarcees and the Kootenay. The aberrant Cheyennes and Arapaho (recently studied by Kroeber) belong to the Algonkian stock. Another evidence of the importance of this stock is the fact that many other stocks and tribes are known to us by names of Algonkian origin: *Eskimo, Athapascan, Siouan,* and possibly also *Iroquoian* and *Muskhogean; Chipwyan, Assiniboin, Mohawk,* etc. Of all the Indian stocks of North America none have made a greater impression upon the whites (French and English) than the Algonkian. This is seen when we remember that Powhatan and Pocahontas, King Philip, Pontiac, Tecumseh, Black Hawk, etc., the Indians who have appealed most to our historians, novelists and dramatists, have all been of Algonkian lineage. This stock has also contributed to the vocabulary of spoken and written American-English some 140 words, of which many are hardly felt to be of Indian origin: *Carcajou, Caribou, Caucus, Chipmunk, Hickory, Hominy, Manito, Maskinonge, Menhaden, Moccasin, Moose, Mugwump, Opossum, Pappoose, Pemmican, Persimmon, Powwow, Pung, Raccoon, Sachem, Skunk, Squash, Squaw, Tammany, Terrapin, Tobogган, Tomahawk, Totem, Tump, Tuxedo,* etc. A people who have contributed to such a cosmopolitan tongue as English important words like *Caucus, Mugwump, Tammany* and *Totem,* deserve more than passing mention. Our civilization owes to them also more material things than these,—tobogganing and lacrosse, canoeing (in large measure) and numerous devices of agricultural and domestic industry adopted by the early colonists from the aborigines. From the Algonkian Indians the whites also learned how to make maple sugar and maple syrup.

The Iroquoian stocks are famous through the confederacy of the "Five (afterward Six) Nations" and the great "League of the Iroquois" (so sympathetically studied by Morgan). Their physical characteristics at the time of the war of 1861–65 were such that they exceeded the recruits of all other races (white included) in points of excellences demanded by military requirements. The high position occupied by woman among the Iroquois lifts them above many of their Amerindian kindred. The story of the Iroquoian statesman of the 16th century, Hiawatha, and his founding of the league that was to end all war and unite all the nations in one lasting bond of peace is a historical fact, which Longfellow's confusion of the Iroquoian patriot with the Algonkian demi-god Manabozho cannot altogether obscure. In political and social organization the Iroquoian tribes attained a position that was largely *sui generis.* The tale of their long struggle to preserve their independence against the whites will be found in Morgan and Parkman, while the 'Jesuit Relations' contain their reaction to the efforts of the missionaries to convert them to the Christian faith, as well as the account of the fratricidal strife resulting in the extermination of the Hurons. The fame of the Iroquoian tribes (for example, Mohawks) as fierce warriors has caused the general public to neglect them in other respects. Through the researches of Horatio Hale and others it has been shown that the Cherokee of the Carolinas (recently so well investigated by Mooney) belong to the Iroquoian stock, together with several minor tribes in the south Atlantic region. This stock has produced a number of eminent men: Hiawatha, Red Jacket, Joseph Brant and Dr. Oronhyatekha (qq.v.), of the Independent Order of Foresters; J. N. B. Hewitt, of the Bureau of American Ethnology at Washington, is also of Iroquoian blood. Sequoia, the half-blood Cherokee, who invented the alphabet now in use by his people, deserves mention here likewise. As compared with the prominent part played by them in the French-English and colonial wars, and in the Revolutionary War, War of 1812, etc., the Iroquoian people left little impression upon the culture and the speech of the English in America,—the words from their language which have crept into our own have been originally place-names: *Chautauqua, Conestoga* (horse), *Saratoga* (trunk), etc. To the French of Canada they have given a few more words. In the place-names of the region about Lakes Ontario and Erie (Ontario, Niagara, Erie, Cataraqui, Oswego, Cayuga, Seneca, Onondaga, Tuscarora, Oneida, Ticonderoga, Tonawanda, Genesee, Ohio, etc.), the Iroquoian peoples are generously remembered, while their Cherokee kinsmen in the south have likewise left their impress upon the topographical nomenclature of the country. In both New York and Ontario, where considerable numbers of Iroquois still live, with no immediate danger of dying out, but particularly in the latter province on the Grand River Reserve, the pagan and Christianized Iroquois have existed side by side in the same community for so long a time as to make this phenomenon, the details of which have been pointed out by David Boyle, of great value to sociologists. See INDIANS, CANADIAN.

The Muskhogean stock (Choctaws, Chickasaws, Creeks, Seminoles, etc.), as their subsequent career in the "Civilized Nations" of the Indian Territory with the Cherokee has shown, are among the most gifted intellectually of the aborigines of America. Gatschet notes as characteristic of this stock: Their color-symbolism for peace and war, their totemic system, the use of the "black drink," the doctrine of the "Master of Life," sun-worship, mound-building (some regard this stock as having been one of the so-called "Mound-Builders"), the ceremony of the *busk,* etc. This stock has had many intertribal wars, and the Creeks and particularly the Seminoles of Florida are famous for their contests with the whites.

The Siouan stock (Crows, Mandans, Assiniboins, Hidatsa, Sioux, Winnebagos, Omaha, Tutelos, Catawbas, Biloxi, etc.), are noteworthy by reason of their migration from the Atlantic slope in the region of the Carolinas to the trans-Mississippian and Missouri country, where their culture was conditioned by the presence of the buffalo and the adoption (from the whites)

of the horse. Their wars with the surrounding tribes, particularly the Algonkian, and their subsequent numerous collisions with the whites (Minnesota massacre of 1862, the troubles in which Sitting Bull figured, etc.), are matter of history. The use of buffalo-skins made it possible for some of the Sioux tribes to develop pictography to a high degree. The researches of J. Owen Dorsey and Miss Alice Fletcher have shown the Omaha in particular to be gifted with a religio-social consciousness of a marked character, reflected in their name-giving and the ceremonies associated with the passage from childhood to manhood, in which individuality is much emphasized. That their capacity for producing men of ability is not confined to those of the primitive type (Sitting Bull) is indicated by the way in which individual members of this stock (Dr. Eastman, La Flesche, the collaborator of Dorsey, etc.), have responded to the stimuli of modern culture. The Dakotan federation is well remembered by the names of the twin States of the Northwest; Minnesota, Nebraska, etc., are terms of Siouan origin; while the minor place-nomenclature of the Northwestern States contains a multitude of names from the same source.

The Shahaptian stock is noteworthy on account of the Nez Percés and the famous chief Joseph, one of the most remarkable Indians of any age, whose "retreat" in 1877 has been compared to the celebrated march of the Ten Thousand of old.

The "Pueblo" Indians, as they are called from their village life, have risen in New Mexico and Arizona above the stage of savagery into a state of semi-civilization, representing the triumph of man over the adverse conditions of the desert and the inroads of fierce enemies of the lowest culture. Their relations to the so-called "Cliff-Dwellers" has been the subject of ethnological speculation. (See PUEBLO INDIANS). Diversity of culture among the Pueblos is not as great as that of speech. Besides the Moqui or Hopi, who belong to the Shoshonean stock, there are found in the Pueblos group three other distinct linguistic stocks, — Keresan, Tañoan and Zuñian. The Pueblos culture has apparently been developed independently in several local centres, and the studies of Bandelier, Hodge, Fewkes, Cushing, etc., have thrown much light on the origins and interrelations of stages of culture largely the reflex of environment.

The Shoshonean or Uto-Aztecan stock offers the most wonderful contrasts in its members of any Amerindian stock. Linguistic and other evidence appears to justify the conclusion that not only certain peoples of the Sonoran country (Cahitas, Coras, Tepehuanas, etc.), some of whom achieved a sort of half-civilization in contact with their more cultured neighbors, but the Bannacks, Shoshones and Utes (even the wretched "Root-diggers") are kith and kin with the ancient Aztecs upon whose civilization Cortes intruded, and the tribes of Nahuatl lineage who carried that culture more or less from central Mexico to beyond Lake Nicaragua. The change from the low type represented by the Utes to the high type of the old Mexicans may have been due in large measure to environment. Intermediate stages are represented by some of the Sonoran tribes. The Mexican or Aztec branch of this stock has furnished to English and other civilized languages a number of interesting and valuable words: *Axolotl, chocolate, coyote, cacao, tamato, ocelot, chilli, copal, chinampa, jalay,* etc. The Moqui group of the Pueblos Indians belong also to the Shoshonean stock.

The Mayan stock (Cakchiquels, Huastecs, Tzotzils, Kekchis, Quiché, Tzendals, Mayas, etc.), creators of the civilization destroyed by the Spaniards in Central America, left, besides graven monuments in large numbers, other evidences of their having invented a system of "writing," which is the nearest approach by any of the aboriginal peoples of America to a phonetic method of record,— the solution of the Mayan hieroglyphics is perhaps *the* question of American archæology. Their calendar-system, nagualism in religion, and the important rôle of women in religious and social functions, deserve especial notice. The explorations of the Peabody Museum (Cambridge) resulted in many new discoveries.

Central and South American Stocks.— The Chibchan stock, whose culture varied from that of the savage Aroacos of the mountains of Santa Marta to the civilization of the country about Bogota, represents a rise from barbarism independent of that to the south in Peru, etc. There is some reason to believe that the "gold-culture" of the Chiriqui country and allied remains in the same region to the borders of Nicaragua may be due to the Chibchan stock,— the Talamanca, Guaymi, and a few other dialects of Costa Rica, etc., show affinities with Chibchan tongues. Their use and working of gold were of a high order, but neither in architecture nor in pictography could they compare with the Peruvians, the Mexicans and the Mayas. They had a characteristic hero-legend of Bochica, and a tale of the great flood. The shrine of Lake Guatavita was a famous religious resort. Some of the famous "El Dorados" were in their territory. The Quechuan stock, which is best known through the civilization of the Incas, superimposed upon an older, wide-spread culture, represents but one phase of higher human activity in the Peruvian area. The extension of Quechuan language especially von Tschudi and Brinton agree in attributing not to the military achievements of this people, which antedated the coming of the Spaniards by only a few centuries, but to intellectual and culture influences millenniums old. The marks of their language can be traced from near the equator on the north to the Pampean tribes on the south. Common in the Peruvian area seem to have been a highly developed agriculture (stimulated, as in the southwestern United States, by the necessity for irrigation and artificial treatment of the soil),— maize, tobacco, potatoes, cotton, etc., the breeding of the llama and the paco, the making of pottery (useful and artistic), metal-working of a fine and ingenious sort, stone architecture more massive and imposing than artistically beautiful, or of the highest order as regards decorative art. The Inca form of government was never probably so far removed from the system common to most of the American stocks as some writers have believed. The Incasic conquest has caused the Peruvians to be styled the "Romans of America," but the analogy is misleading. Beyond the use of picture-writing and the employment of the quipu (knotted

STONY INDIANS WEARING RICH OTTER AND ERMINE TROPHIES

colored strings) for purposes of record, the Peruvians had not advanced, and the semi-phonetic system, like that of the Mayas, was not developed by them. Ancestor-worship and sun-worship (state religion) were professed by the Peruvians, but the most far-sighted of their thinkers touched almost upon monotheism. The hero-god of the Peruvians was the sea-born Viracocha, about whom centred a rich and imaginative mythology. The mixture of races in the production of ancient Peruvian culture is indicated by the diversity of cranial type among the skulls from the old burial grounds and mummy-caves. North of the Quechuas, on the coast about Trujillo, were the Yunca-Chimus, etc., whose civilization is represented by the ruins of Gran Chimu and other remains in the valley of Trujillo, which preceded the period of Inca domination. Southeast of the Quechuan culture was that of the Aymaras on the Andean table-lands. To them are usually assigned the ruins of Tiahuanaco, near Lake Titicaca, which in their completeness were probably the most imposing structures raised by the hand of aboriginal man in America,—in architecture they differ in several notable ways from the buildings of Inca origin. Dr. Uhle has very recently sought to show the "succession of cultures" at Pachacamac, Trujillo, and their relations to that of Tiahuanaco. The Peruvian tongues have furnished modern English, etc., many words: *guano, condor, alpaca, pampa, paco, llama, coca, quinine, jerked* (beef), *vicuña* etc.

In the northern part of the Argentine Republic (province of Jujuy, etc.) the architectural and archæological remains brought to light by recent investigators (Ambrosetti in particular) indicate the presence of a "civilization,"—village life in a desert environment, offering striking analogies with the culture of the Pueblo Indians of Arizona and New Mexico. This Calchaqui culture is evidently much more than the mere reflex of Quechuan-Aymaran conquest which it was formerly considered to be. Its origin and growth, however, remain to be clearly demonstraed.

The Araucanian stock, whose language has been studied by Lenz, are famous for their long resistance to the Spanish arms (the story of the "conquest" has been written by Guevara), part of which gave rise to De Ercilla's epic of 'La Araucana' (q.v.). To the Araucanian stock belong tribes on both sides of the Chilean Andes and a number of the nomadic peoples of the Pampas, where they seem to be intruders rather than aborigines. Chilean Spanish has borrowed many expressive terms from Araucanian.

The Patagonians, Tzonek, or Tehuelche, have been famous since the time of Pigafetta as "giants" (many of them exceed six feet and some are said to reach seven). To them belongs the "Setebos" of Shakespeare's 'Tempest.'

The Tapuyan stock of Brazil is looked upon by some authorities as the oldest people of the continent—some would affiliate with them the Fuegians, in this respect—representing a race once inhabiting a great part of South America. The man of the caves of Lagoa Santa and the man of the remarkable *sambaquis* or shell-heaps of the Brazilian coast are by many authorities considered to have been related to the Tapuyans. Characteristic modern Tapuyans are the Botocudos, so called from the labret they wear in the lower lip. According to Ehrenreich, some of these ancient men of Brazil show affinities with prehistoric man of eastern Europe.

The Tupian stock (or Tupi-Guaranis, as they are also called), whose language was much used by the missionaries for general intercourse with the natives and is the basis of the *ligoa geral*, or "common language" of the region of the Amazons, was perhaps the highest in culture of the Brazilian tribes, having the elements of agriculture, village life, pottery (well developed and rather artistic), urn-burial, etc., but nothing beyond the Stone Age. Intermixture with both whites and negroes has taken place in the Tupi area, and the rich and imaginative tales of animals, etc., belonging to Tupi mythology have thus been given a wider extension, while negro and white influences have made themselves felt, both on the language and the literature of these people. According to Hartt, the Tupi language has influenced the Portuguese of Brazil quite as much as has the latter the former. Tupi-Guarani speech has furnished to the various European tongues a considerable number of words—to English, *ipecacuanha, jaguar, tapioca, tapir, toucan*, etc.

The Cariban stock were long famous for their cannibalism (the word *cannibal* is a corruption of one of their ethnic names), real and attributive, and their skill in making and using canoes. The shaman, or medicine-man, had great power among them, and they practised the curious and remarkable custom of the *couvade*. Rock-inscriptions and pile-dwellings are found in their territory. Some of them have been reduced to sad straits by the contact of the whites, but some of the Venezuelan tribes of this stock are still good, typical representatives of the American Indian.

The Arawakan stock, through its representatives (the Bahamian Lucayans, the natives of Haiti, Porto Rico, Cuba, etc.), was the first of the aboriginal peoples of the New World (exclusive of Greenland and Labrador) to come into contact with the white race, and likewise the first to come under its devastating influence. Many of the tribes of this stock were of a mild and gentle disposition, good agriculturalists, pottery-makers, workers in stone, wood and gold, and excellent canoe-men (the word canoe comes from an Arawak dialect). They were users of cotton, and to them we owe the first Indian invention adopted by the whites (*hammock*, both name and thing are Arawak). From the Arawaks, too, the Spaniards first learned the use of tobacco. Like the Caribs they practised the *couvade*. The name of the stock is said to mean "flour-eaters," on account of their use of cassava, which has also passed over to the white. The Arawak and Carib stocks have furnished to English and to the other civilized languages of Europe a large number of important words, the exact ethnic distribution of which is not easy to determine with exactness: *Agouti, anotto* (and French *roucouyenne*), *barbecue, cacique, caiman, cannibal, canoe, cassava, colibri, hammock, hurricane, iguana, macaw, maize, manati, potato, tobacco*, etc. And with these names has gone the use of many of the things indicated and made known for the first time to Europeans. The debt of the Spanish and Portuguese settlers of South America and the West Indies is in these respects very great, for, nat-

urally new fruits, plants, trees, etc., and many of their products came to be known by their aboriginal names or by corruptions of them. Thus a number of "balms" and "balsams" and other medicinal products retain in the pharmacopœia names of American Indian origin — *copaiba, tolu,* etc. Timber-trees, ornamental and dye-woods, have also largely kept their native appellations throughout Central and South America — the list would run into the hundreds. Large also is the catalogue of birds and other animals bearing Indian names.

Original Habitats.— The question of the original habitats of the important aboriginal stocks is one of the most interesting in American ethnology and archæology. The researches of Rink and Boas in particular seem to have demonstrated that the primitive home of the Eskimo was in the region west of Hudson Bay, whence they spread northward and westward to Alaska, etc., and eastward (north and south) to the Arctic islands, Greenland and Labrador. See ESKIMOS.

The earliest habitat of the Athapascans was in northwestern Canada, to the westward of the home of the Eskimo. From there they migrated over the lake country, across the Rockies to the southward, leaving colonies along the Pacific to northern California, and sending out, through Arizona and New Mexico to the borders of the Nahuatl territory, the important branches of the Apaches and Navaho — the raids of the Apaches often reaching far into Mexico.

The original habitat of the Algonkian stock was, as Brinton and Hale have assumed, "somewhere north of the Saint Lawrence and east of Lake Ontario," while that of the Iroquoian lay "between the lower Saint Lawrence and Hudson Bay." The final result of the migrations and wars of these two stocks was to leave the Iroquois of the Ontario-Erie country entirely surrounded by Algonkian tribes. From their primitive home the Algonkian sent out numerous branches west, south, southwest, etc., making the extent of territory covered by them very large, and bringing them into immediate contact with many other Indian tribes and with the white settlers over a vast area. The Iroquois (in the Cherokee and the kindred tribes of the south) had branches, which were so separated from their northern kin as to be long taken for non-Iroquoian peoples.

The Muskhogean stock, according to Gatschet, have been from time immemorial inhabitants of the country between the Appalachian Mountains, the Atlantic, the Gulf of Mexico and the Mississippi. The scene of their earliest development was in the neighborhood of the Mississippi, or possibly even beyond it.

The chief migrations of the Caddoan (Pawnee) peoples have taken place in historical times northward and southward from the Platte River, from which region they expelled in part the Siouan tribes, etc. If their own traditions are reliable, their primitive home lay farther to the south, on the Red River of Louisiana.

The primitive home of the Siouan stock (characteristic Plains Indians since the introduction of the horse) was eastward in the region of the Carolinas. This fact has been revealed by the study of the Tutelo and Catawba languages belonging to this eastern area, and by inspection of the traditions of the various Siouan tribes. The main bodies of Siouan migrants followed the Ohio and the Missouri far to the north and west; the Mandans, Assiniboins, etc., reaching to within the borders of Canada. Other minor bodies traveled to the southwest, their representatives still existing in the Biloxi, etc., of southeastern Mississippi. The Siouan tribes seem to have followed the buffalo in its retreat westward, and their migration from the Carolinas is of considerable sociological interest. At one time their trans-Mississippian habitat included practically all the territory between the Arkansas and the Saskatchewan from the great river to mid-Montana, with the Winnebagoes jutting out on Lake Michigan. Their forays and trade-excursions led some of them from time to time across the Rocky Mountains.

The original habitat of the Shoshonean or Uto-Aztecan stock, which embraces the Ute, the Sonoran and the Aztecan (Nahuatl) peoples, and has representatives from the north of Idaho to the Isthmus of Panama, was probably somewhere in the northwestern section of the United States. The primitive home of the Shoshonean section was "somewhere between the Rocky Mountains and the Great Lakes," and the traditions of the other two branches bring them from the far north, as compared with their present southern abode.

The Mayan stock, creators of the civilization of Central America, according to their own traditions, came from somewhere to the north — the position of the Huastecan branch of this stock north of Vera Cruz suggests that the Mayan emigrants from the home-land skirted along the Gulf of Mexico from some region considerably to the north.

The Arawakan stock (including the natives of the Bahamas and the Antilles, except the intrusive Caribs) had an extension in South America comparable only to that of the Algonkians and Athapascans in the northern half of the continent — from the high Paraguay to the Goajiran Peninsula in Venezuela, and in its greatest expansion from the Xingù to the Amazon and Orinoco. Its primitive habitat was in some part of the Brazilian interior, probably between the Xingù and the Paraguay, the general trend of their migrations having been northward. The Cariban stock, another very extensive people, who at the time of Columbus' discovery were to be found in the smaller West Indian islands, and the northern part of the continent from the Essiquibo in Guiana to about the Isthmus of Panama, came originally, as the presence of the Carib Bakairi on the Xingù indicates, from the high interior of Brazil, at the sources of the Xingù and Tapajos.

The Tupian stock was widely extended at the time of the discovery along the Atlantic Coast region from La Plata to the Amazon, with branches scattered along the Paraguay and the Madeira to the foot of the Andes. Their primitive home, Brinton, with reason, assumes to have been in the central highland country to the east of Bolivia. The general direction of the earliest migrations of this stock was therefore southward (down the Paraguay to the Atlantic), after which the Tupi branch followed the coast to the Amazon. The Tapuyan stock, who once occupied the region between the Xingù and the Atlantic Coast (from the latter they have been driven by the Tupis), are probably the oldest human residents of part of this

area, their tenure of the seacoast reaching far back into prehistoric times.

The Chibchan stock, to which was due the civilization of the Bogota region of Colombia, had their original habitat in the Andean highlands of central or southern Colombia, whence they wandered northwest into the Isthmus of Panama and northeastward up the Magdalena.

The Quechuan stock, authors of the most remarkable of South American civilizations, according to their own traditions spread from very small beginnings in the country about Lake Titicaca; but von Tschudi and Brinton, for linguistic reasons chiefly, find the primitive home of this people to have been in the extreme northwest of their characteristic area. The Aymara stock, which some authorities consider to have been a branch of, or perhaps an old member of the Quechuan, had its original habitat to the southeast of the latter. The relation of the Aymaran stock to that which produced the Calchaqui civilization of the northern Argentine is not clear.

Language and Writing.—Although the languages of the American aborigines, constitute so many independent families of speech, the vocabularies of which are entirely divergent one from another, nearly all (if not all) of them possess certain general grammatical characteristics which justify us in classing them together as one great group of human tongues. Brinton enumerates as points of resemblance: Development of pronominal forms, fondness for generic particles and for verbs over nouns, and incorporation — the inclusion of subject or object (or both) in the verb, etc. Most American Indian tongues may be called "holophrastic," from the practice of compressing a whole "sentence" into a "word," the length of which is sometimes very remarkable. As an example may be cited the Micmac (Algonkian) *yăleoolemăktâwepokwŏse*, "I am walking about carrying a beautiful black umbrella over my head." This word, according to Rand, is derived from *pokwŏsŏn*, "an umbrella"; *măktâwăe*, "I am black"; *wolăe*, "I am beautiful"; *yăleă*, "I walk about." From the Kootenay language may be cited: *Nătltlămkinē*, "he carries the head in his hand" (*n*, verbal particle; *ătl*, "to carry"; *tlăm*, composition form of *ăaktlăm*, "head"; *kin*, "to do anything with the hand"; *inē*, verbal); *hinūpqanăpinē*, "thou seest me" (*hin*, "thou," subject pronoun; *ūpqa*, "to see"; *ăp*, "me," objective pronoun; *inē*, verbal). As typical incorporative languages the Iroquoian and Eskimo may serve. All the incorporative forms of speech in America do not, however, proceed upon identical lines; and some that do incorporate, like Kootenay and Eskimo, often have one or more cases. According to Dixon and Kroeber many Californian languages do not possess the feature of incorporation at all (such are, for example, Maidu, Pomo, Yuki, etc.). As types of incorporating languages less complete than Iroquoian we have Kootenay, Siouan, Aztecan. Some of the Central and South American tongues seem also to have little incorporation. Otomi and Maya appear to be evolving in somewhat the same direction as modern English, away from incorporation and grammatical plethora. Many of the Amerindian tongues are both prefix and suffix languages; others prefer prefixes, others, again, suffixes. Some possess, and some do not, a plural form for nouns; a dual; gender-distinction in pronouns; a high development of demonstratives; reduplication; syntactical cases, etc. A few possess grammatical gender and some exhibit differences in the words used by men and women. In the matter of phonetics the languages of the American aborigines are remarkably divergent, some being extremely harsh, guttural and consonantic, others equally smooth, soft and vocalic. The absence of certain consonant sounds and the equivalence of certain vowels and consonants characterize some forms of American speech. Euphonic changes are of major or minor importance. Sentence-construction differs greatly in various tongues. The position of the adjective is not always the same. The Haida language has even a distinction like that between our *shall* and *will*. Careful investigation of the many Indian languages, as yet studied imperfectly, if at all, may reveal other interesting linguistic phenomena. How much has been written about and in some of the languages of primitive America may be seen from the bibliographies of Pilling! Our knowledge of them varies from a brief vocabulary of the Esselenian to the exhaustive dictionary of Yahgan compiled by Bridges. The native literature runs from the unrecorded tales of the northernmost Athapascans to the poetry of the ancient Mexicans and Peruvians, some of which has been handed down from pre-Columbian times. The only actually phonetic (syllabic) alphabet now in use among the Indians (except the syllabaries introduced by missionaries among the Athapascans, Crees, etc.) is post-Columbian — the invention of a half-blood Cherokee. A sort of alphabet has, however, sprung up more recently among the Winnebagos. The development of picture-writing varied very much among the numerous tribes, as may be seen from Mallery's classic study of the subject. Sometimes, as is the case with the Kootenays, ability to draw does not seem to have been accompanied by exuberant pictography. The Walum Olum of the Delawares, the "calendars" of the Kiowa, Sioux, Pima, etc., are special developments of primitive records, the highest form of which is seen in the manuscripts ("books") of the Aztecs and Mayas of a religio-historical character. The pictographic records of the Ojibwa "medicine men" have been studied by Hoffman, and the rite-literature of the Cherokee by James Mooney. The native literature of primitive America has been the subject of special monographs by Dr. D. G. Brinton. The Spanish-American countries have furnished several writers and investigators of Indian descent.

There might be mentioned here also the "Chinook Jargon" of the Columbia River region, the "Ligoa Geral" of Brazil, and the minor jargons and trade languages of other sections of the continent, which prove how the Indian has compelled the white man, more or less, to use his language in some form or other for the purposes of friendly or commercial intercourse.

Religion.— The mythology and religion of the American Indians have received particular treatment at the hands of Müller, Brinton, Powell, etc. Perhaps the most general myth of importance is that of the divine hero, teacher and civilizer, who, after accomplishing his labors, leaves the earth, promising to return

at some future time. This myth is found in Mexico (Quetzalcoatl), Yucatan (Kukulkan), Colombia (Bochica), northeast North America (Manabozho, Gluskap, etc.). Somewhat analogous is the myth of the twin reformers of the primitive world among the Pueblo Indians, Navahos, etc. The Iroquoian stock have the myth of the contest of the good and bad mind. The Algonkians have a myth-circle of the rabbit, the tribes of the northwest Pacific coast one of the raven and thunder-bird, the Rocky Mountain peoples one of the coyote, the Brazilian Indians one of the jaguar, etc. Some of the tribes are very rich in animal myths and, as Mr. Mooney asserts, the characteristic tales of "an 'Uncle Remus' nature" found among the Cherokee and other peoples have not, as many suppose, been borrowed from the negroes of the South. Even the famous "tar-baby" tales have their independent Amerindian analogues. Flood-legends are widespread in America and vary from the simple, locally colored stories of rude Athapascans to the elaborate conceptions of the civilized peoples of Mexico, Central America, etc. The cardinal points and the number four have developed with many tribes a rich symbolism, with which the chief colors are often connected.

The "medicine men" of the Ojibwa, the Cherokee, the Apache, have been investigated by Hoffman, Mooney and Bourke, and a large amount of accurate and authentic information concerning shamanism among the Amerindian peoples has been accumulated. The power of the "medicine man" varies much from tribe to tribe,— with some he is a personage of little or no importance; with others he is the controlling influence in secular as well as in religious affairs. The acme of such influence is found among some of the tribes of Guiana and Brazil. These "medicine men" had often their secret societies and "lodges" into which chosen neophytes were admitted with appropriate ceremonies. They had also, with many tribes, the control of the rites to which the youth were subjected at the time of puberty, with others they performed such marriage ceremony as existed. Besides these shamans, there were "prophets" and religious reformers, especially since contact with the whites. The widespread "Ghost Dance," in its more recent outbreaks, has been studied in detail by Mooney. Worthy of note is also the "new religion" of the Iroquois, and the "Shaker" religion of the Indians of Puget Sound. The investigations among the Pawnee by Miss Fletcher and G. A. Dorsey have demonstrated the existence of a relatively high form of primitive religion in a rather unexpected quarter,— their worship of the morning star in connection with agriculture was, however, at one time accompanied by human sacrifice. The mortuary rites of the American Indians, corresponding to diverse ideas of the soul and its future in the other world, varied from simple neglect of the corpse to what is represented in material form by some of the mounds of the Mississippi Valley and the stone tombs of Peru. The mortuary customs of the aborigines of North America have been made the subject of a special monograph by Dr. Yarrow, and the doctrine of "animism" among the South American peoples has been treated at length by Koch. The contemplation of the *totem* (properly Ojibwa *ododema*),— tribal or family mark,— of certain Algonkian tribes has given rise to theories of "totemism," concerning which there is much dispute in the world of science. "Fetishism," as exemplified in the Zuñis, has been investigated with some detail by Cushing. Cannibalism (the word *cannibal* is the corrupted form of a South American tribal name) has been rarer in America than is generally believed. Outside of its occurrence through necessity in ways known to civilized peoples, it was chiefly partial and ceremonial. Epicurean cannibalism flourished along the coast of South America and on some of the Caribbean islands; ritual cannibalism among certain tribes of the northwest Pacific coast, in ancient Mexico, etc. The almost extinct Tonkaways of Texas have the reputation of being the "last of the cannibals," while the Attacapas owe their name to this practice attributed to them by their neighbors. In the legends of the Cree and Ojibwa tribes of the Algonkian stock, a cannibal giant (wendigo) figures, and a horror of human flesh eating is expressed at the present time, whatever may have been the case in the past. From the condition of human bones and other remains in the shell-heaps of various parts of the coast, some authorities have come to the conclusion that cannibalism did exist in prehistoric ages among some of the Indian tribes. Religious ideas approximating to monotheism are attributed by some chroniclers and investigators to some of the more enlightened aboriginal rulers of Mexico and Peru. In these regions of the continent, as also in Central America, architecture and the arts of commemoration and record were at the service of religion. See AMERICAN MYTHOLOGY; FOLK-TALES AND MYTHS OF AMERICAN INDIANS.

Amusements.— The games of the American aborigines, some of which, like lacrosse, have passed over to their conquerors, are of sociological and religious significance in many instances. Stewart Culin has made a special study of the games of the North American Indians, and rejects the theory favored by Tylor and others, that many of them (for example, Mexican *patolli*), are imports from Asia. The games of the civilized Aztecs seem to be but "higher developments of those of the wilder tribes," and those of the Eskimo are modifications of games found among other aboriginal peoples of America. Among characteristic Amerindian games may be mentioned the gambling game with sticks, the hoop-and-pole game, the ball-race of the southwestern United States, the ball-games of eastern North America, the woman's game of double ball, foot-races, the snow-snake, etc. Culin holds that back of every game lurks "a ceremony in which the game was once a significant part." The variations in games do not follow linguistic lines. One centre whence games have radiated and where some of their oldest forms are still to be found is in the southwestern United States, from which their migrations can be traced north, northeast, east and south. Interesting modifications arise from conditions of environment.

Arts and Inventions.— The arts and inventions of the American Indians correspond to the extent and variety of their environment. The mass of the inhabitants of the continent at the time of its discovery were hunters and fishers, or agriculturalists of the Stone Age, most of whom had some knowledge of pottery-mak-

ing. The house followed the lines of climate and culture, from the snow *iglu* of the Eskimo and the rude *wickiup* of the Utes to communal houses of the Mohegans, the Iroquoian "long-house," phalansteries of the Pueblan and Central American areas, and the stone dwellings of a more or less pretentious sort of the civilized peoples of Mexico, Central America and Peru. The cavate lodges and cliff-dwellings of Arizona and New Mexico, the wooden (sometimes underground) houses of the northwest Pacific coast, the skin-tents of the plains tribes and the wigwams of the Algonkians, the earth-lodges of the Mandans, etc., correspond to environmental stimuli. A like variation may be seen in the cradles of the American aborigines, studied by Mason, and in their means of transport on the water,— kayaks, "bull-boats," woodskins and balsas, dug-outs, canoes of pine and birch bark, large and small, and of all varieties of design and finish. In North America the Algonkians and Iroquois, and in South America the Indians of the great Brazilian water-ways, have made themselves celebrated for their skill in navigation. So too has the Eskimo with his kayak and the Peruvian with his balsa. The Algonkian Etchemins are literally "the canoe-men." The seagoing canoes of the fishing tribes of the coast of Alaska and British Columbia also deserve mention. On land some of the American Indian tribes have used the dog (Eskimo in particular) and the sled (the Algonkian toboggan, adopted by the whites for amusement purposes, is a special form), while in Peru the llama has been employed for ages for "packing," but not for draft purposes. The use of the horse and the modifications of primitive culture thereby induced in the Indians of the plains of the Missouri-Mississippi Valley, the llanos of Venezuela, the pampas of the Argentine, etc., are, of course, post-Columbian. So, too, the influence of sheep culture upon the Navaho and their primitive industries, and of the cow among certain South American tribes. The only animals domesticated by the Indians whose use amounted to a considerable factor in their social and religious life were the dog and the llama, the latter in Peru and Bolivia only. The other half-domesticated animals and birds are of little importance as culture elements. The domesticated dogs of pre-Columbian America represent several diverse species of *Canidæ*. The absence of such domesticated animals as the cow, the horse, the sheep, etc., in pre-Columbian America accounts for certain limitations of its culture as compared with that of the Old World. Pets, however, bird and beast, were very common, especially in Brazil and Guiana. The disappearance of the wild buffalo and other animals of the chase, since the coming of the whites, has been fateful for some tribes,— the contact with the latter as represented by the various "fur companies," etc., has caused many changes in the life of the aborigines, seldom for the better.

As Mason has pointed out, the Amerindian traps and other devices for the capture of wild animals indicate intellectual skill and marvelous adaptation to the habits and actions of these creatures. The Eskimo harpoon and its appurtenances, the simple and composite bow, the arrow-poisons of some North American and many South American peoples, the manufactures of obsidian and jade in ancient Mexico, cotton weaving and dyeing in the more southern regions, maguey-paper making in Mexico and Central America, stone carving (from Mexico to the Argentine), feather-work (in the southern United States, Mexico, Central America and parts of South America), gold working (in the Isthmian region, Colombia, etc.), the hammocks of the Venezuelan tribes, the fish-poisoning devices of many peoples of South America in particular, the fine pottery of many regions of the continent, the *quipus* or knotted record-strings of the ancient Peruvians, the primitive drum-telephone of certain Brazilian Indians, the blow-gun (southeast United States and South America), cassava preparation (northern South America), the bolas of the Pampean tribes, etc., represent the diversity of invention and manufacturing skill among the American aborigines. The lamp of the Eskimo and some of the Indian tribes of northwestern North America is *sui generis* (its importance has been emphasized by Hough). Methods of computing time, season, etc., vary from the slanting stick of the Algonkian Naskopi to the elaborate calendar systems of Mexico and Central America. Of musical instruments, the drum, the flute, the pan-pipe, and the "musical bow" were known to the American Indians. Songs and dances to the accompaniment of these were in vogue. Practically all stages of primitive culture were to be found in pre-Columbian America, if we may judge from the tribes now surviving, from the savage Seris to the ancient Mexicans, Mayas and Peruvians. Moreover, within the bounds of the same linguistic stock, as noted above, there may be found tribes representing a high and a low stage of development; as for example, the Aztecs and the Utes of the Shoshonean stock, the Dogribs and the Navahos of the Athapascan, etc. Some tribes were pre-eminently fishers, others hunters. Many excelled in both, like the Eskimo and some of the peoples of the northwest Pacific Coast. Some sort of agriculture was widespread in America — the cultivation of corn, beans, varieties of pumpkin and squash, etc., was known all over eastern North America, and the regions of the southwest, etc.; and typical tropical and semi-tropical and other plants and fruits (potato, tomato, maize, pineapple, tobacco, varieties of cotton, manioc, sweet-potato, cacao, coca, etc.) were cultivated in the more southern regions of Mexico, Central and South America. The spread of tobacco and maize in North America and of certain other plants in Central and South America indicates agricultural receptiveness on the part of the many tribes concerned. The capacity of the American Indians generally for agriculture has been underrated probably, as both the desert-born cultivation of the Pueblo Indians and the tropically stimulated cultivation of the Indians of South America indicate. The arid regions of the Peruvian coast offer another example of considerably developed agriculture. In America utilization of the gifts of the earth varied from the seed picking and root digging of the Utes to the market gardens and chinampas of ancient Mexico. How the necessities of agriculture can shape a religious system may be seen from the rites and ceremonies of the Pueblo Indians, the cult of "mother corn," etc. With

some tribes tobacco was more or less of a sacred plant, also the mescal.

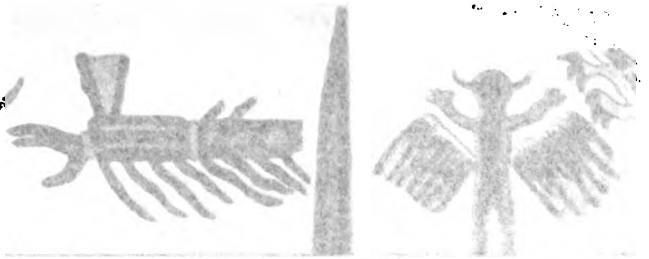
Position of Woman.— The relation of women to agriculture gave them a higher standing with certain tribes than would otherwise have been the case. With the Iroquois the position of women was very high and to them was allotted a considerable share in the government, peace negotiations, etc., and female chiefs were by no means unknown — women were the "mothers of the nation." Among the Mayan peoples of Central America woman's position was also high. Many of the priests were women, and they were also commonly the leaders of their tribes in rebellion against the Spaniards — the most famous was Maria Candelaria, "the American Joan of Arc," who led the insurgent Tzendals in the 18th century. In ancient Mexico and Peru the position of woman was perhaps not quite so high. Among some tribes the position of woman was very low, and her sexual peculiarities added to the disesteem in which she was held, as for example, among the Tacanan Araunas of Bolivia. The Athapascan tribes vary much in their treatment of woman — with some she is little better than a slave or servant, while with at least one Alaskan people of this stock female chiefs existed at times. The "purification" of women at the period of their menses, and the segregation of girls at the time of puberty, were accompanied with many rites and ceremonies among various tribes from the rude Athapascans to the civilized Aztecs. The curious custom of the *couvade* (imitative child-bed on the part of the husband) prevailed among many Venezuelan, Guianian and Brazilian peoples. The relations between environment and the share of the sexes in culture has been investigated by Mason; according to whom the zenith of virile Amerindian art is reached in Peru, while in Colombia we find woman as farmer, weaver and potter. In the Oregon-California region one art, basket-making, reaches its acme of development in the hands of woman. A large female influence in religion is noticeable among the Pueblo Indians. Among some tribes, for example, the Hurons, the weregild for killing a woman was greater than that for a man. Some sort of matriarchal system, with maternal descent, prevailed very commonly in pre-Columbian America; among certain of the Koloschan Indians, for example, a man was considered to be in no sense related to his father, his sole parent being the mother. Besides this extreme form, numerous other varieties occur among the tribes now existing, the system in vogue among the Iroquois, etc., being more complicated and adapted to social needs. The systems of marriage known to the American Indian varied from the absence of any particular rite or ceremony to selection of the wife by the old women of the tribe, as among the Hurons, or the uniting of the couple by the "medicine men." Some of the tribes of the Brazilian forests, ranking very low in culture, are strictly monogamous; while peoples of higher civilization, like the Chibchans, Mexicans, Peruvians, etc., were polygamous or concubinative, or both. Marriage by purchase was found over a large area of America; but here as in other parts of the globe, the "money" received was often rather a compensation to the parents for the loss of their daughter than a real sale of her to a suitor. Divorce, in many forms, is known to the primitive Americans, both by mere word of the husband and according to set forms and rites. Consanguineous marriages were strictly avoided by many tribes; but among a few, such as some of the lowest Athapascans, incest was not condemned. In the matter of the sex-relations, as in many other fields, the American Indians exhibit almost all possible phases from the monogamic chastity of some of the lowest peoples to the unnatural indulgences of the Peruvians. Runaway matches and marriages for love, in spite of the contrary opinion entertained by some authorities, have been by no means uncommon throughout the continent. Suicide on account of unsuccessful wooing by both sexes is also not at all rare. Some peoples, too, have developed love-songs of a romantic order, for example, the *yaraveys* of the Quechuas.

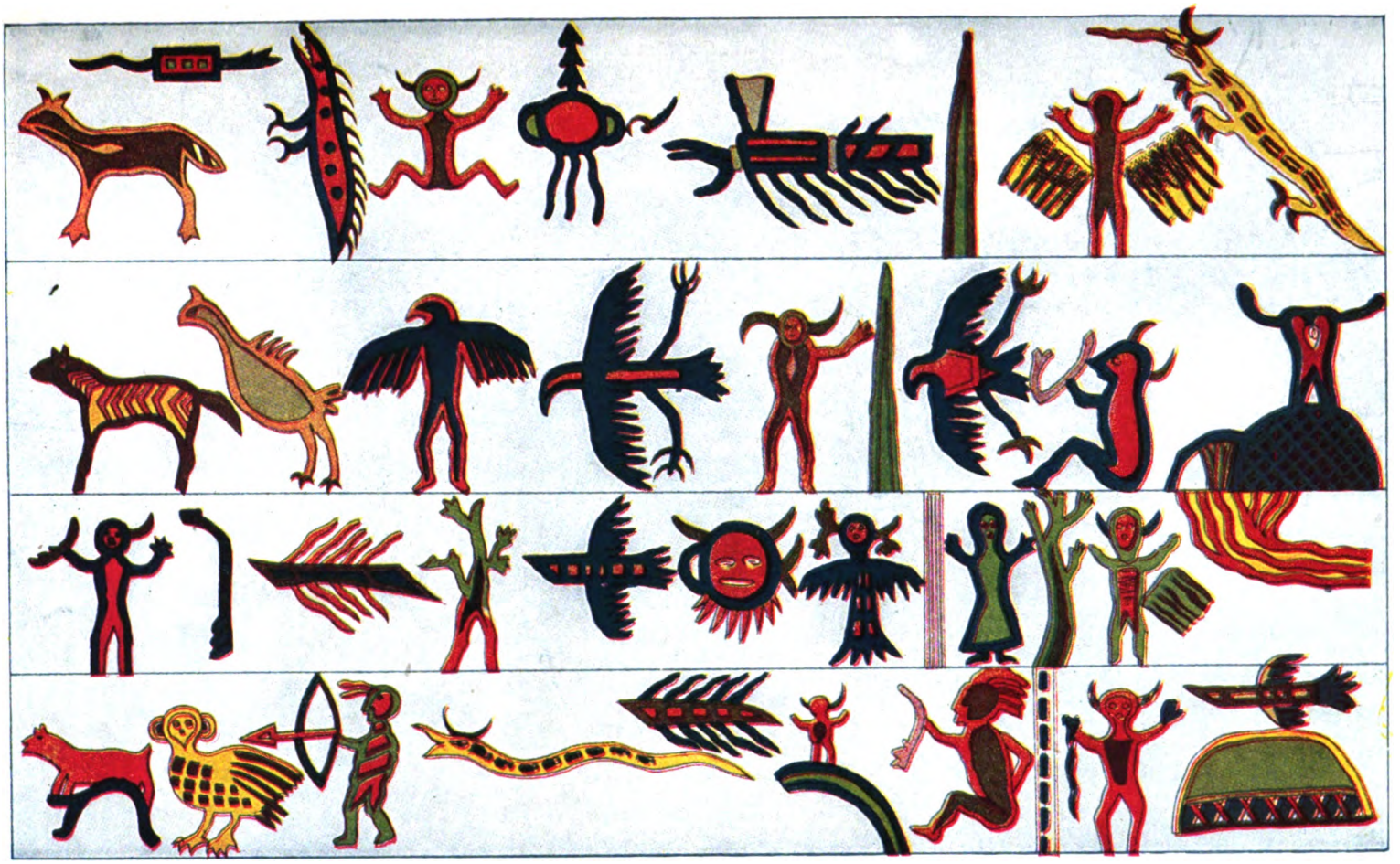
Government.— The systems of government of the American Indians and their tribal organizations range from the simple democracy of the Kootenays and some of the Brazilian Indians to the elaborate state institutions of the ancient Mexicans and Peruvians, which in several respects resembled the corresponding institutions of Mediæval Europe or the ancient classic world. The power of the chief, however, seems everywhere to have had limitations, and some tribes distinguished the permanent peace chief and the temporary war chief. Chiefs were generally elected, either from the body of the tribe or from certain specified families. "Totemism" and secret societies are not found to any extent, if at all, among certain tribes (the Kootenay, for example); while with many of the peoples of the northwest Pacific Coast they are perhaps the chief feature of aboriginal society, as Boas has recently shown. Property rights are represented in many stages, from the semi-anarchic Eskimo to the Aztecs of Old Mexico and other peoples of Central and South America. Slavery existed among many tribes, and on the northwest Pacific Coast a sort of traffic in human chattels had arisen. See SLAVERY.

Trade and Commerce.— Within the spheres of the culture-centres of Mexico, Central America, Peru, etc., trade and commerce were well developed. The Columbia River region was the scene of a less developed trade; while the southeastern United States, the region of the Great Lakes and country west and south of them, had also their important distributing points. The region of Bering Strait was likewise an Asiatic-American commercial centre.

Education.— With the lower tribes generally, such education as was imparted to the children was given by the father to the boys and by the mother to the girls. People like the Iroquois, the Siouan Omahas, etc., used the instruction of tales, legends and proverbs. The ancient Aztecs and some of the other semi-civilized peoples of Mexico and Central America had schools for boys and others for girls, in which the duties proper to each sex were taught under the supervision of the priests.

Physical Characteristics.— The physical characteristics of the aborigines of America mingle uniformity with diversity. The skin color, popularly styled "red" or "copper," is





PICTURE WRITING OF THE OJIBWAY INDIANS

designated by Mantegazza, "burnt coffee," and by Brinton, "brown of various shades, with an undertone of red." This but varies from rather dark to rather light. Among the lighter tribes have been reckoned the Koloschan Tlinkit, the Bolivian Yurucari, etc., and among the darker the Charmas of the Gran Chaco, the Bolivian Canisianas and a few other tribes of South and Central America. The hair is generally termed "black," but, as Brinton notes, there is in it "a faint under-color of red," which shows up more in childhood and seems much more prominent with certain tribes than with others. Red hair is known among American Indians, but in some cases (certain South American tribes, for example), its occurrence may be due to infusion of white blood. The eyes of the Indians are, with rare exceptions, dark brown. The stature varies from rather low to rather high, represented on the one hand by some of the shorter Brazilian tribes and on the other by the Patagonian "giants." Among the peoples presenting many individuals of tall stature may be mentioned the Yumas and Pimas, some of the Muskhogean tribes, some of the Crees, Ojibwa and eastern Algonkians, Pawnees, Iroquois, Siouans, Huaveans, Ramas, some of the Cariban tribes, Yurucari, Cayubabas, Guaycuruans, Patagonians, etc. So far as is known no dwarfish people comparable to the dwarf races of the Old World existed in America, although the skeletons from certain Peruvian tombs prove the existence of a dwarfish element in the general population; and the stature of many individuals among certain Brazilian tribes is so low as to induce some authorities, with Kollmann, to predicate the former existence of a dwarf race. In the relations of trunk and limbs and in the relation of one limb to another many variations occur among the Indians, due to occupation (canoeing, etc.—and, since the advent of the whites, horse-riding). In primitive America all the chief forms of skull (often with artificial flattening, etc.) are found. Among the dolichocephalic (long-headed) peoples are the Eskimo and Iroquois generally, some of the Muskhogean tribes, Otomis, Aymaras (partly), Tapuyas and Tupis (largely), etc. Of the brachycephalic (broad-headed) may be mentioned the Araucanians, Caribs, Arawaks, Patagonians, Mayas, many of the tribes of the Pacific Coast region of North America, etc. The civilized peoples of Mexico, Central America and Peru appear to have been of stature below the average and of varied skull form tending to brachycephalic, indicating mixtures of types. In the Columbia River region type-mingling is indicated also by both stature and skull-form. The Peruvian region is another centre of race-mixture, as evidenced by skull-form. The oldest skulls discovered in prehistoric burial-places or in geological *situ* are not distinct from the American types—the latest found, the "Lansing skull," is quite Indian. The skull capacity of the Indian is below that of the white in general, but many exceptions occur. The brains of the less cultured Indian peoples (Fuegians, Eskimo), show no decided anatomical inferiority to those of civilized Europeans. Great varieties of build and set of body are found among the American Indians, from the half-starved Fuegians to the well-fed and corpulent Iroquois. Small feet and hands are very common. Among many tribes in various parts of the continent handsome men and women of considerable beauty are to be found. In the case of women, an admixture of white blood often enhances their beauty.

Race-Fusion.—The intermingling of the American Indians with the intruding white race has been much greater than is generally believed. The extent of this fusion of races varies from certain parts of North America with their classic Pocahontas examples to Uruguay, in South America, where 90 per cent of the population are said to be of mixed blood. The Eskimo of Greenland have intermarried with the whites (Danish fathers, native mothers), so that except in the parts remote from settlements no pure-blood Eskimo exists; and the same is true of a good deal of Labrador, where the contact has been with fishermen of English descent. The Micmac, Abnaki and related Algonkian tribes of Maine, New Brunswick, etc., have a large admixture of white blood (French fathers, native mothers), and all over Canada and the northwestern United States in the early days of colonization and exploration the French traders, trappers, *voyageurs* and *coureurs des bois* mingled freely with the native women, particularly those of the various Algonkian peoples of the Great Lakes and the West. The Hudson's Bay Company, by introducing employees of English and Scotch descent into the Canadian Northwest, made possible other *métis*, of which those of Scotch descent on the father's side are said to be healthy and sturdy specimens of humanity with more than ordinary capacities. As indicated by the present condition of the Iroquois on the reservations in Quebec, Ontario and New York, some infusion of white blood has taken place from very early times. Here the combination of white mother (often an adopted captive) and native father is more common than is usual in race-mixture. The Cherokee had an admixture of white blood in ante-Revolutionary days, to which Mooney attributes much of their culture-achievements since that time. In Mexico, Central America and South America generally, as Talcott Williams has very recently noted, the half-breed element is very large indeed, for the native population was never exterminated by the whites as some histories still teach. Of the 40,000,000 inhabitants of South America it has been estimated that less than 10,000,000 can lay any claim to pure white blood. There is reason to believe that the future of some of the South American countries will be as much in the hands of the Indians as in those of the whites. In Mexico, parts of Central America, Colombia, Peru and Chile, the strain of Indian blood represents able and intellectual aboriginal peoples. In certain parts of South America, and, sporadically in northeastern North America, intermingling of Indians and negroes has occurred, giving rise to the so-called Cafusos, etc., of Brazil, and a few other small groups. The mixture of white-Indian-negro is also found here and there. In some of the Spanish-American countries there is a special vocabulary to designate the numerous degrees of *métissage*. In the Canadian Northwest the half-breeds have taken a prominent part in the development of the country (one noted *métis*,

Norquay, was premier of the province of Manitoba), and they are likewise noteworthy in the annals of the northwestern United States. In Mexico and Central America, not alone the *métis* but the Indians themselves have produced celebrated men. Juarez, the liberator of Mexico, a really great man, was a full-blood Zapotec and President Barrios of Guatemala a Cakchiquel (Mayan stock).

Treatment by Whites.—The ill treatment of the American Indian by the whites has often been such as to stamp with eternal dishonor the conquering race. Massacres, broken treaties, land-robbing, commercial swindles, etc., mark the path of advancing "civilization." English, Dutch, French, Portuguese and Spanish have all been guilty at some time or other. The English in Newfoundland, the Americans in the West, the Castilians in northern Mexico and Yucatan, have exterminated or sought to exterminate whole tribes. We must, however, believe that the accounts of the early chroniclers concerning the "millions" of Indians slaughtered by the Spaniards were the customary exaggerations of those who sing the victor's deeds. Peru and Mexico, for example, would not contain so many Indians to-day were those stories literally true. Against the centuries of dishonor in the treatment of the Indians by the whites we may place the efforts of missionaries of all faiths, from the good Las Casas in New Spain to Duncan of Metlakahtla. The Jesuits among the Iroquois and Algonkians in North America, the Moravians among the Eskimo and some of the Algonkians and Iroquois, have all done good work, which only the incapacity or worse of governmental authorities has made null. The missions in California and the "reductions" in various parts of South America (Paraguay in particular) might have succeeded in keeping the Indians gentle and loyal sons of the Church had the good fathers been forever in charge, but the oncome of the more strenuous life of the whites doomed them to helplessness. The story of the Paraguayan experiment is one of the most interesting in the annals of mankind, but also one of the most disheartening. Against such failures a few bright spots may be set,—the Fuegian mission for example. A better treatment of the Indians still within the borders of the United States has been in progress for several years. See INDIAN AFFAIRS.

Influence on Civilization.—The contributions of the aborigines of America to the world's stock of civilizing factors and influences are much more numerous and of greater importance than is generally thought. Besides the innumerable place-names in all parts of America of Indian origin, the Algonkian, Peruvian, Brazilian, West Indian, Guianian, Venezuelan and Mexican words in English, French, Spanish and Portuguese (whence many of them have spread into all the civilized languages of the world) are able remembrancers of the conquered race. The literature of the Spanish-American countries and of Brazil has been more or less affected by the stimuli of native theme and treatment. Many of the old dances and folk-customs still survive even where Christianity has been at least outwardly accepted and have sometimes been adopted by the descendants of the European colonists. The 'Hiawatha' of Longfellow and the tales and dramas based upon the deeds, adventures and romantic episodes in the lives of King Philip, Pocahontas, Pontiac, Tecumseh, etc., to say nothing of the novels of Cooper and his successors, indicate that the Aryan mind of the Anglo-Saxon order has found treasure in the Amerindian soil. In Mexico and other parts of Spanish America the cathedrals and other religious edifices, by intention or by happy chance often occupy sites sacred to pagan deities ages before Columbus' discovery — so the new religion gathers strength from the old, and the dislocation of faith so common in Protestant countries is avoided to a very large extent. Of more material things, we owe largely to the Indian the paths over which our highways and our railroads run, while many of our cities and towns have only sprung up on the old camp-sites of our predecessors. The great importance of some of these "Indian ways" in the history of the United States has been pointed out by Hulbert. The Indians' knowledge of the great water-ways of the country, of portages and trails through forest and over mountain, has made possible colonization and settlement otherwise utterly out of the question. Indian hunters and fishers, scouts, guides, canoe-men, carriers and packers, in all sections of the American continent, have been indispensable to the progress of white civilization. Nor have Indian slaves and servants been few or without social significance in some quarters; while French, Spanish and English have at times availed themselves of the services of Indian warriors,— the Iroquois enlisted for the North and some of the Cherokee for the South in the Civil War, and then the government has sometimes set one tribe off against another. In Canada and part of the northwest of the United States, where commingling of the races has taken place, the civilization of the land owes even more to the half-breed, *voyageur, coureur des bois,* etc, than to the Indian himself. See CANADA — POPULATION; RACIAL, DISTRIBUTION AND IMMIGRATION.

Throughout the continent — more especially, however, in parts of South America — devices for hunting and fishing and appliances in woodcraft, primitive agriculture, etc., were transferred to the European colonists during the period of settlement, and many of them are still in active use. Fish-poisoning by narcotics, the use of the blow-gun for killing birds and small animals without damaging the skin, methods of stalking beasts of the chase, certain traps and snares, etc., belong here. In connection with agriculture we have menhaden-manure, guano, etc., the planting of corn and beans or pumpkins together, the burning over of land before tillage, etc. But it is upon the food-supply of the world that the American Indian has exerted the greatest influence. Potatoes (common and sweet, both), maize and the tomato, now in use by all the civilized world, were first cultivated by him and taken over by the whites after the discovery. Cacao, vanilla, jalap, the kidney bean, several varieties of squash and pumpkin, manioc, Jerusalem artichoke, coca, agave, quinoa, persimmon, and perhaps also the peanut, came to us from the Indians. Maple-sugar and maple-syrup, pemmican, jerked beef, etc., are from a like source. Tobacco, the great narcotic, was one of the first gifts of America to the Old World. Of

drinks the American Indian has given us Paraguayan *maté*, "Labrador tea" and several other like concoctions, chocolate, Mexican *pulque* and a considerable number of other intoxicating beverages from South America.

Many medicines and medicinal plants were made known to the whites by the Indians, and in the era of settlement and colonization the "Indian doctor" (male and female) was not unimportant — New England, for example, had its "Joe Pye," after whom the "Joe Pye weed" (*Eupatorium purpureum*) is named. The Californian Indians have furnished perhaps the three most important contributions of recent years to the American pharmacopœia. South America, besides numerous locally known remedies, etc., has furnished the world-famous *quinine*, and *ipecacuanha*, while the drugs *cocaine* and *curari* must ultimately be credited to the aborigines of America. Many dye-stuffs and dye-woods were first given to the civilized world by the Indians, both for domestic use and for employment in the larger world of æsthetic manufacture. These dyes range from the poke of northeast North America for dyeing basketry to the famous roucou or anotto of Venezuela, used, among other purposes, for staining cheese. Pottery and other household utensils of Indian manufacture are used throughout Spanish America. The hammock of the Arawak Indians belongs now to all civilized peoples. All that india rubber means, civilization owes to the Indian. Both in small things and in great the American aborigines, through their gifts to the white race, will long be remembered, even if, as some authorities (upon imperfect evidence) believe, they are rapidly passing away. On this point one may cite the remark of Deniker that Humboldt in 1825 estimated the total population of America at 13,000,000 whites, 6,000,000 half-breeds, 6,000,000 negroes and 9,000,000 Indians, while a comparative computation made in 1916 reckoned 120,000,000 whites, 42,100,000 half-breeds, 12,006,000 negroes and 12,000,000 Indians; total, 186,106,000. See AMERICA: POLITICAL DIVISIONS.

Antiquity of Man in America.— The question of the antiquity of the American Indian culture is difficult to settle satisfactorily. Time must be allowed for the divergence of the original stock into numerous (more numerous in pre-Columbian eras) tribes and peoples inhabiting America at the time of its discovery,— time for the production of the Eskimo and the Iroquois, the Carib and the Patagonian. Time, again, must be allowed for the development of the Aztec from the primitive Shoshonean, the Mayan from the rude stock of that people, the Chibchan from the savage Bolivian, the Peruvian from the ancient barbarian of equatorial America. Then the civilizations of Mexico, Central America and South America as such probably took ages to rise and flourish. Town and village life, with all its social and religious implications, the differing architectural monuments of the various centres of American civilization, etc., did not spring up in a day, any more than did the culture of mediæval Europe. The domestication of the dog, the llama, etc., the change of maize, tobacco, the squash, the tomato, the potato, the pineapple, etc., from wild to cultivated plants, require a long lapse of time. Moreover, it is now known that American Indian languages do not now change and have not in the past changed at the fast rate once assigned to them by philologists. So, while one may not believe that America was the original habitat of the human race, he may be certain that very many millenniums have elapsed since the "Red Man" began his career as the autochthone of the New World. There seems every reason to believe that at the close of the Glacial Age man had spread over a considerable portion of both North and South America and was contemporary with European man of an early epoch. To calculate man's residence in the American environment by years is impossible on present evidence. Dr. Stoll assures us that the linguistic phenomena met with in the Mayan dialects alone require thousands of years for their evolution, and some of the results deduced from the Mayan hieroglyphs by certain investigators imply the existence of civilization of the Central American order for very many millenniums. Perhaps it is fair to say that man has been in America at least 25,000 years and not more than 200,000, and that the civilizations of Mexico, Central America and South America were probably as long-lived as those of Rome, Greece, etc. They were also in many respects just as typical of human attempt and achievement, for the American Indian was a man as we are men.

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Editorial Staff of The Americana.

INDIANS, Canadian. There is no figure in history so picturesque as that of the North American Indian. The stormy life of the various nations or tribes, the concentrated cruelty of individual character combined with loyalty and honor in tribal relations; the almost constant and bloody struggles between the tribal units, and the prolonged conflict with the white invaders of the continent; the complexity of the savage temperament in its mingled simplicity and guile, its courage and endurance, its treachery toward foes and cruelty in war, its pride and prudence alternating with periods of insane recklessness and a humility akin to that of a beggar, its self-restraint and moments of unbridled rage, its strange conjunction of greatness and littleness; stamp the American aborigine as a most extraordinary human product. See INDIANS.

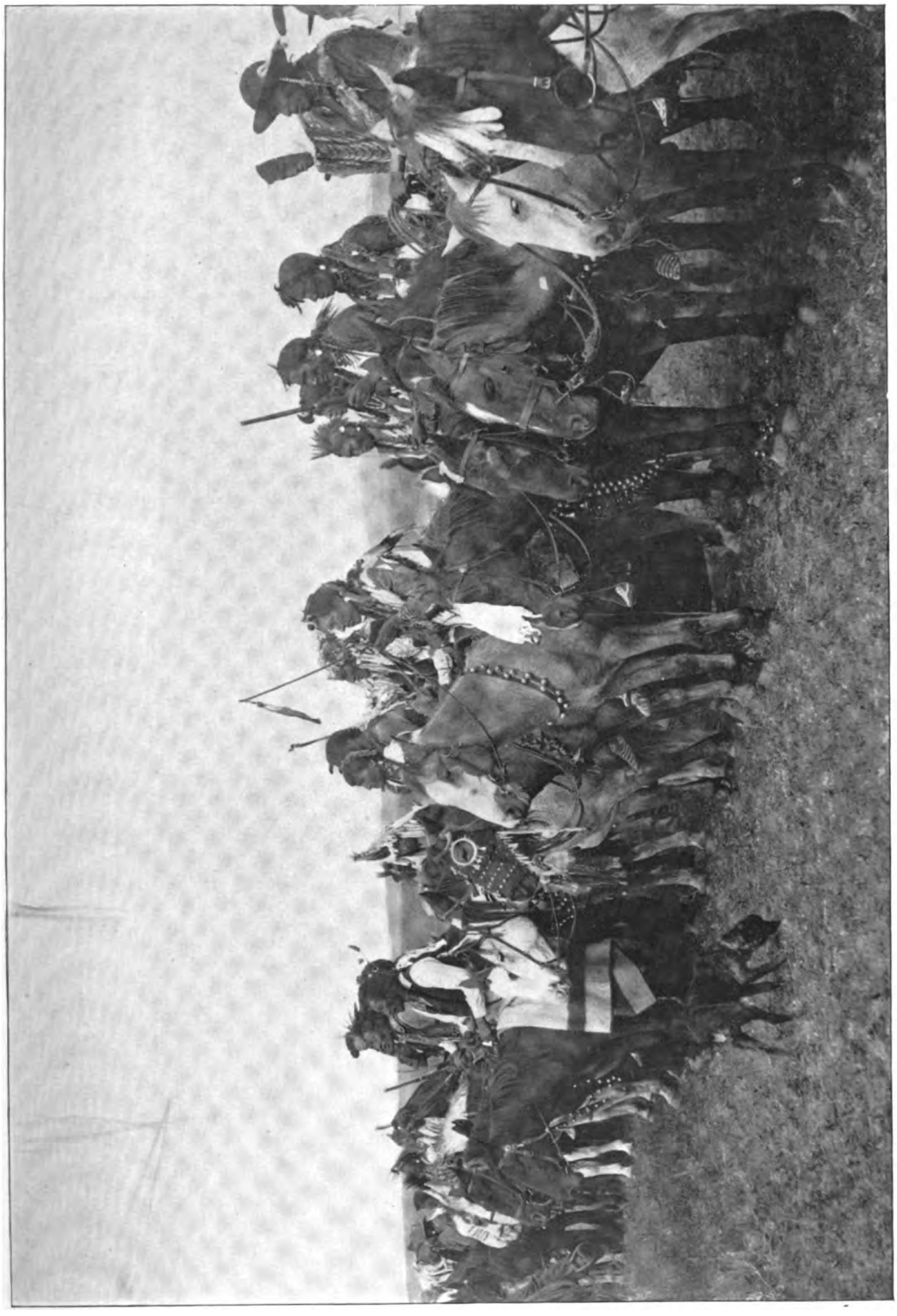
Character of the Indian.— History has yet to do him justice. Cold and hard, passionate and revengeful, ignorant and superstitious, keen and quick in thought, he has yet in pre-civilization days never been guilty of the effeminate and meaner vices which destroyed peoples such as the Romans or the Aztecs. Love of liberty in its wilder forms, and contempt for all arbitrary rule or personal control, he carried to an extreme greater than can be elsewhere paralleled. Sleepless suspicion of others was a part of his environment of war and treachery. As with nearly all savage races, his strategy was that of surprise, followed by ruthless and unhesitating slaughter. A product of primæval conditions, he could not change his character without deterioration, or his mode of life without physical and mental injury. Civilization indeed has destroyed the Indian. In curbing his wilder passions it has usually developed the meaner ones, and the destruction of the environment which made him the barbarous yet noble owner of a boundless domain has cramped his intellectual acuteness, starved his wonderful physical qualities, and fatally affected the code of morality which he undoubtedly possessed. Agricultural pursuits and a veneer of Christianity may fit the survivors for life amidst new conditions, but the result of this development, in Canada at least, no more typifies the Indian of past centuries than the Greek of to-day is the true heir of Leonidas at Thermopylæ, or the modern native of Rome the just inheritor of imperial valor.

Distribution of the Indian Tribes.— When the first discoverers and explorers found their way amidst the wilds of Canada, they came into collision with various Indian nations. The great family of the Algonquins extended right up through the centre of the continent. They formed the chief central race of early Canada, and reached in scattered masses from the Atlantic to Lake Winnipeg and from the Carolinas to Hudson Bay. Cartier met them when he ascended the Saint Lawrence; the early English settlers encountered them along the coasts of Virginia; the people of New England fought them under King Philip. William Penn made peace with them under the trees of the Keystone State, and the French Jesuits and fur-traders found the same race in the valley of the Ohio, on the shores of Lake Superior and at the rapids of Sault Sainte Marie.

Of this race were the Delawares and the Shawnees. The latter were a strange and wandering people, whose location it was always difficult to fix, but who are known to have more than once come into conflict with the French of Quebec. They eventually settled on Canadian soil and played a brief but important part under Tecumseh in the War of 1812. The former were at one time conquered by the Iroquois and compelled to bear the opprobrious Indian name for women, but in one of the French and English wars they recovered at once their courage and their position by espousing the side of the French. Other branches dwelt along the Canadian shores of the Atlantic and in the wastes north of Lakes Michigan, Superior and Huron. The latter tribes included the Ojibways, Pottawatamies and Ottawas, who at one time formed a sort of loose union and offered a temporary but for the time being an efficient check to the course of the Iroquois conquest. In this region also were the Sacs, the Foxes and other smaller divisions of the Algonquin race. Other branches in Nova Scotia were known as the Micmacs, in western New Brunswick as the Etchemins, in Quebec as the Montagnais, and in the Far North as the Nipissings.

The Iroquois or Five Nation Indians stretched across what afterward became the State of New York into Ontario and Quebec, and included the Mohawks, Oneidas, Onondagas, Cayugas and Senecas. Though united in a sort of loose confederacy and by a system of clanship, they seem to have had no clearly defined and continuous ruler, but to have trusted their joint affairs to the central council at Onondaga. And, though numbering only about 4,000 warriors in their day of greatest power, they were able to make the name of the Five Nations a word of terror to all the tribes from Quebec to the Carolinas and from the Far West to the Atlantic shores. To the French and the American colonists they were a continuous source of dread, while to the English forces in Canada at a later period they became an arm of military strength a little difficult to define in degree.

A people not inferior in courage but not nearly so aggressive in character as the Iroquois were the Hurons, whose name is so well known through their intercourse with the French Jesuit missionaries. Their population is estimated by Parkman as having been about 10,000 souls, though other writers place the number at double that figure. In the superior nature of their dwellings, in their manners, cus-



Indians at Calgary, Alberta, Canada

toms and superstitions, they closely resembled the Iroquois. They met destruction at the hands of that great confederacy, and after 1680 disappear from view, except in a few isolated settlements under French protection. The Neutral nation, living along the north shore of Lake Erie and remaining for a long period neutral between the Hurons and the Five Nations; the Andastes, dwelling in fortified villages in the valley of the Susquehanna; the Eries, living in the vicinity of the lake which bears their name, were all of kin to the Iroquois, and were all in time conquered and practically destroyed or incorporated by that most powerful of the savage nations of North America. Then followed the conquest of the Delawares, or Lenapes, and the expulsion of the Ottawas from the vicinity of the great river which bears their name. In 1715 the Iroquois were strengthened by the admission of the Tuscaroras, a warlike people of admitted kinship, to the confederacy, as a sixth nation.

The original population of these various tribes and races and nations of kindred origin can, of course, only be estimated. Garneau, in his 'History of French Canada,' puts the Algonquin total at 90,000 souls, the Hurons and Iroquois together at about 17,000, the Mobiles of the Far South at 50,000, and the Cherokees, of what is now the centre of the United States, at 12,000. His total is 180,000 for the greater part of the continent, and in view of the constant condition of warfare in which they were involved, and the statements of travelers like Cartier, Joliette, Marquette, De la Jonquière, etc., it is probably not underestimated. Even as it is, however, the fact of the dominating power of a few thousand Iroquois during so many years affords an interesting illustration of the effects of military skill and preparedness under savage conditions.

Habits, Customs and Appearance.— In conduct it should be remembered the early Indian was kind and hospitable to the exploring European. The Jesuit and Recollet missionaries, in what is now Canada, bear testimony in many cases to this fact. Hakluyt, in his account of Cartier's first visit to Hochelaga (1535), says that "the Indians brought us great store of fish and of bread made of millet, casting them into our boats so thick that you would have thought it to fall from Heaven." The personal appearance of the Indians, their customs and beliefs, have been often described, and with most varying degrees of accuracy or the reverse. The fact is that changing conditions brought about frequent changes in manners and appearance. The Huron, or Wyandotte, in days when he was a successful rival of the Iroquois, could hardly be recognized in the fearful and unaggressive convert of the missionaries during the years of his final struggle and disappearance. The Delawares, in their period of active life and power, were not the same people as the subject slaves of the Iroquois, nor were the latter in their earlier times of peace and trade like the fiery savages whose conquering warwhoop became a signal of death from the Great Lakes to the Mississippi.

The Indian races of Canada were emphatically the product of nature, however, and amongst them all were similarities which stamped them as of the same origin and as possible descendants of Migrating Tartars from the Steppes of central Asia. They were as a rule tall and slender and agile in form, with faces bronzed by sun and rain and winds. Their expression was stern and sombre, seldom or never marked with a smile. Their heads had high cheek-bones, small sunken and keenly-flashing eyes, narrow foreheads, thick lips, somewhat flat noses and coarse hair. The senses of sight and sound and feeling were developed into a sort of forest instinct which seemed almost supernatural to the first white settlers. Their costumes of deer-skin and moccasins, their necklaces of wampum, beads or shells, their ornaments of feathers and claws and scalps are well known, as is the vermilion paint with which they delighted to daub their faces and bodies. The only weapons they possessed before the Europeans came were the arrow and tomahawk. Hunting and fishing were their occupations, war their pastime. All these pursuits made permanence of dwelling very difficult and involved naturally a life of almost ceaseless wandering.

Religions and Superstitions of the Indian. — Their religion was always a peculiarly mixed quantity. Champlain states that the Micmacs had neither devotional ideas nor ceremonies. Other tribes assured him that each man had his own god whom he worshipped in silence and secrecy. They seem, however, to have all worshipped something — whether the spirit of good, the spirit of evil, the spirit of storm, the god of war, the spirit of the mountains or a spirit of the waters. Sacrifices were not uncommon, and Father Jogues is authority for having seen at least one human sacrifice amongst the Iroquois. How far they really worshipped one Great Spirit is a matter of uncertainty, and it has been claimed that the early missionaries suggested to their minds an idea which they were quick to absorb through the questions and answers naturally given. However that may be, there can be no doubt of their intense belief in spiritual manifestations and interventions. They peopled the very air with friendly or hostile spirits, and raised amongst themselves those powerful manipulators of superstition — the medicine men — to control the surrounding demons of storm and famine, disease and death. To the same men were given the care of the sick, and mixed up with much that was harmful, there were no doubt many simple remedies used supplementary to a mass of incantations and superstitious mummery. Dreams they put great faith in, and oratory held a place of honor secondary only to personal prowess. But the chief of all important customs of the Indians turned upon war and its occasionally brief concomitant, peace. A struggle between two tribes of nations could be brought on by the most trivial cause, or by almost any ambitious and restless individual. When determined upon, it became the source of uncontrollable joy, of wild dances, of eloquent harangues, of multitudinous prayers and sacrifices, of feasts and endless bravado and boasting.

Relations with the French and English.— In the wars between the French and English and Americans which devastated parts of North America during nearly 300 years, the Indians exercised a large influence and, had they been united, might more than once have expelled the white invader altogether. The Indians

found the French more congenial, but preferred the English to trade with, as they paid better prices. In their efforts to secure the suppression of the liquor traffic, the French bishops and missionaries were brought into conflict with the traders, who on their part urged that if they did not obtain brandy (and orthodoxy) from the French they could obtain rum (and heterodoxy) from the Dutch and English. Roughly speaking the Algonquins and Hurons stood by the French, the Iroquois and some minor nations by the English. When the Five Nations had beaten the Algonquins and destroyed the Hurons, they turned their attention to the French, and several times brought the settlements on the Saint Lawrence to the very verge of destruction. After the supremacy of England seemed finally established there existed for some years a sort of brooding trouble. The New England colonists had never treated the Indians upon their borders well, and the result had been a long series of reprisals and wasting war. Greedy traders and unscrupulous speculators in land had robbed the Indians of their intellect by brandy, and of large tracts of land by fraud. The American Colonies, indeed, claimed the whole soil, and without British permission, though in the king's name, made frequent and large grants of Indian territory and then seemed surprised when the tomahawk and scalping-knife were used in response by the untutored savage. Finally, land regulations were made by the home government which to some extent stopped this sort of lawlessness, and were respected in Canada, though more or less disregarded in the Thirteen Colonies as the spirit of local revolt developed. Sir William Johnson, of the Mohawk Valley in New York, was appointed superintendent-general of Indian affairs, and he did his best to enforce these regulations.

When the Thirteen Colonies plunged into revolution the majority of the Indians stood by Great Britain. Those who did not take an active part with the Iroquois stood aloof — with the exception of the Oneidas and Tuscaroras — and refused all the efforts of Congress to obtain their co-operation. At the close of the war (1783) the Iroquois were given large grants of land by the British government and, under the guidance of Joseph Brant — Thayendanegea — the brilliant chief who had led them throughout this period, settled in various parts of the new province of Upper Canada. In 1812 many served again under the British flag, while other nations and tribes were brought together by the martial spirit and influence of Tecumseh — a leader who fills an interesting place in Canadian history. Since then the Indians of Canada, with the exception of a very few who were led astray by Louis Riel in the Northwest troubles of 1885, have lived at peace amongst themselves and with the white men, and have been trying to become accustomed to a life of monotonous civilization and, to them, somewhat degrading labor.

Indians of the West.— The Western Indian, under the long and reasonably wise administration of affairs in what are now the provinces of Manitoba, Saskatchewan and Alberta, by the Hudson's Bay Company, acquired characteristics different from those of other parts of the Dominion. They were not in such a state of tutelage as in Ontario; they were trusted in the matter of supplies and the trust was rarely abused; they became an easy-going, light-hearted people, with something of the white man's shrewdness in trade and all of the native's agility on foot or in a canoe. When the old order passed away in 1871 and the country was acquired by Canada, there was much ferment, but it gradually gave way before the wise treaties, made from time to time, allotting on behalf of the Crown certain reserves which were selected by joint action, on a basis of 640 acres for each family of five, and administered with, upon the whole, fairness and justice by government officials. These treaties were as follows:

No.	Year	District, etc., dealt with	Indians concerned
I.	1871	Province of Manitoba	3,270
II.	1871	Lake Manitoba, Souris and Moon Mountain	2,185
III.	1873	Lake of the Woods, etc. (55,000 square miles)	2,673
IV.	1874	Lake Winnipeg to Cypress Hills (75,000 square miles)	6,886
V.	1875	Lake Winnipeg and river Saskatchewan (100,000 square miles)	3,182
VI.	1876	Plain and Wood Crees. Upper Saskatchewan (120,000 square miles)	6,622
VII.	1877	Blackfeet of Bow River (35,000 square miles)	7,681
VIII.	1899	Peace River Valley (342,700 square miles)	3,733
IX.	1905–06	Indians of the Albany River and James Bay and north of watershed of Lakes Superior and Huron	2,047
X.	1906	Crees and Chippewayans of northern Saskatchewan	723

These Western Indians were, and are to some extent, divided into a series of loose confederacies — the Blackfeet, including the Bloods, Piegans and Blackfeet; the Sioux, including the Stoney or Assiniboine tribe and various branches of the Sioux; the Cree, including the Plain Crees, the Wood Crees and the Muskegon Crees; the Ojibway Confederacy. In British Columbia the Indians at the present time number about 25,000 and are lowest in the scale of the Canadian tribes. They include the Coast Indians and the Mountain Indians and are divided chiefly into the Tinne and Thlinkit tribes and various subdivisions such as the Shuswaps, the Tahlkill, the Tahltan, the Taku, the Kaska, etc. With the Indians of Canada, as a whole, there have been some 1,540 treaties made from time to time and involving the exchange, or sale, of lands, or the relinquishment of claims. The Indian population of Canada as at 31 March 1916 was 105,561, divided as follows: Alberta, 8,682; British Columbia, 25,737; Manitoba, 11,935; New Brunswick, 1,874; Nova Scotia, 2,119; Ontario, 26,305; Prince Edward Island, 302; Quebec, 13,348; Saskatchewan, 9,962; Northwest Territories, 3,769; Yukon, 1,528.

INDIANS, Catholic Education of the. Upon the discovery of America in 1492, the various religious orders of the Roman Catholic Church hastened to send missionaries to the new field. A small school for the education of the natives was an accompanying feature of each mission station, and after Cortes had conquered Mexico, Franciscans, Dominicans and Jesuits in course of time educated and converted the natives to Christianity, and founded missions and schools which exist there to-day, and in California, now an integral portion of the United States, but formerly part of Mexico. North and south the missions and schools were

established and as germs of diocesan organizations bore fruit in the foundation of the see of Caracas in Venezuela in 1531; that of Lima, Peru, in 1539; of Chiquisaca, Bolivia, in 1551; and of Santiago, Chile, in 1561. Brazil was entered in 1500 by Franciscans who were followed half-a-century later by Jesuits. The first Brazilian see was founded at Bahai in 1561; in La Plata, now Argentina, the see of Cordova was founded in 1570, and there in course of time the Jesuits built up a magnificent college. In Central America, Franciscans began their work of education and conversion in Costa Rica in 1560, and during the last 30 years of the century friars labored successfully in Guatemala, teaching the arts of civilized life along with the doctrines of salvation. Early in the 17th century, Jesuit fathers entered Acadia (Nova Scotia) and Canada, and in 1659 the first episcopal diocese in the region was organized at Montreal. Torture and martyrdom did not deter these brave champions and pioneers of Christianity and civilization, and the development of the United States followed the pioneer growth of Catholic congregations and schools among the native Indians. In the first half of the 19th century, the Indian nations of the Rocky Mountains and Northwest Territories (American and Canadian) were pagan. The Jesuit Father De Smet made the long and dangerous journey from Saint Louis, Mo., to the headquarters of the Flathead nation in Montana, inaugurated the introduction of Christianity and prepared the way for the advent of younger members of the order. See CATHOLIC INDIAN MISSIONS IN THE UNITED STATES.

INDIANS, Education of the. Indian education as formerly conducted in the United States was in no way the outcome of any deliberate plan on the part of the Federal government, but was directly descended from the first attempts to teach the Indians of Virginia, and particularly from like beginnings in Massachusetts, where the remarkable results of John Eliot (q.v.) were achieved.

Eliot's Work.— Eliot was actuated by high motives, and his simple measures were chosen with consummate wisdom. Having familiarized himself with the language, disposition and character of his Indians, he secured their confidence and respect. Those who would follow him he gathered in towns, where he taught them the liberties and responsibilities of township government and the devices and institutions of civilized life, among which the Church and the school naturally occupied places of honor. A number of "choice Indian youths" he induced to attend English schools that they might prepare themselves for missionary work among their own people. He was warmly supported by "the corporation for the propagation of the Gospel in foreign parts," by the General Court of Massachusetts, and particularly by Daniel Gookins, the official superintendent of the Indians in Massachusetts. Eliot began his work in 1646. In 1674 there were 14 towns of "praying Indians," whose schools and churches, in the majority of instances, were administered by educated natives, and an Indian college had been founded at Cambridge. Yet in due time this success was swept away by the fears and prejudices which developed under the baneful influences of the Indian wars. Similar successful work under the direction of John Cotton and Richard Bourne in Plymouth colony shared the same fate.

Other Endeavors.— Followers of Eliot in the 18th century were John Sergeant at Stockbridge, Mass., and Eleazer Wheelock in Connecticut and New Hampshire. The work of Sergeant, which involved the establishment of day schools, of a boarding-school and an experimental "outing system," was almost ideal in conception, but ended with the deportation of his Indians to the West. Dr. Wheelock's labors led to the establishment of an effective training school and, indirectly, to the creation of Dartmouth College "for the education and instruction of youths of the Indian tribes in this land in reading, writing and all parts of learning which shall appear necessary and expedient for civilizing and christianizing the children of pagans, as well as in all liberal arts and sciences, and also of English youths and any others." Only the last purpose was destined to achievement.

Surviving Influences.— But in spite of external failure, the spirit and much of the form of these early enterprises persisted. Their impress was until recently observable in almost every prominent feature of the Indian-school organization of the United States, notably in the establishment of day schools in or near Indian villages as a means of domestic and industrial uplifting of Indian family and village life; of industrial boarding-schools in territory occupied by Indians, to introduce among the young a taste for the refinements, duties and responsibilities of civilization; of advanced training-schools in civilized English-speaking communities for the fuller equipment of "choice Indian youths" for full citizenship in such communities, or for missionary work in the ideals, institutions and arts of civilization among their own people. It is still seen in the universal stress in all schools upon instruction in husbandry, certain trades and domestic arts; in the "outing system," which places partially educated Indian girls and boys as paid helpers in suitable English-speaking families, and affords them instruction in the ordinary public schools; and in the importance attached to religious and ethical training.

Wrong Departures.— On the other hand, it is to be deplored that a number of valuable features of the early schools were later abandoned, and even supplanted by opposite tendencies — the unintelligent warfare against the Indian idiom; the introduction of certain brutalities of military discipline; an equally mistaken effort to wean Indian youth from Indian association by throwing contempt upon the Indian and by stimulating a feeling akin to hatred of Indian family ties; and in general a policy of compulsion and repression, rather than a spirit of development and benevolent helpfulness. Serious harm came to government schools because patronage entered as a factor in the appointment of officers and employees. Thanks to the Indian Rights Association, the Mohonk Conference, and a number of other societies, in 1893 civil-service rules were applied to employees of the Indian schools.

History of Organization.— The successive steps in the organization of Indian schools have been as follows: After the Revolution little heed was paid to Indian education for 30 years.

Only minor appropriations are recorded on the basis of treaties with a few tribes. But in the first quarter of the 19th century a religious revival directed attention to Indian education as a Christian and national duty. Congress responded in 1819 with an appropriation of $10,000 in addition to certain treaty obligations. In 1820 the President was authorized to apply this sum annually in aid of societies and individuals engaged in the education of Indians. In 1823 $80,000 was expended in 21 schools maintained by missionary bodies, $12,000 having been granted by the government. In 1825 the number of such schools had risen to 38, their entire expenditure to $202,000, of which the government, directly and indirectly, had contributed $25,000. In 1848 there were reported in operation 16 manual-training schools, 87 boarding-schools and other schools. These schools continued to increase in number and efficiency up to 1873, under the control of missionary bodies, with scanty aid from the government, which had established only a few small day schools directly under treaty provisions. After 1873, however, the government entered upon an era of great activity in the establishment of strictly government schools. In 1877 Congress appropriated for schools, outside of treaty provisions, $20,000; in 1880, $75,000; in 1885, $992,800; in 1890, $1,364,568; in 1895, $2,060,695; in 1899, $2,638,390; in 1900, $2,936,080; 1901, $3,083,403.65; 1902, $3,251,254; 1910, $3,757,909; 1916, approximately $4,500,000. The expenditures have doubled within 20 years, and trebled within 25 years. During the quarter century the average attendance rose in more than like ratio. Increased appropriations naturally stimulated a desire on the part of the government to control expenditures. Moreover, the Constitution, by implication at least, forbids the appropriation of public funds for denominational purposes. Conclusions unfavorable to government support of missionary schools were further strengthened by the fact that the Roman Catholic Church had gradually outstripped the Protestant missionary bodies and was absorbing the lion's share of government support. In 1893 the Methodist Episcopal Church withdrew from participation in government aid, but without abandoning its schools. In 1895 this example was followed by the Presbyterians and Congregationalists; in 1896 by the Friends; and in 1897 by the remaining Protestant denominations. This left only the Catholics in the field with an appropriation, and in 1901 it was withdrawn from them also. In 1894 Congress had declared its policy of abandoning all support of denominational schools, and this policy has gradually been followed out.

The Schools of To-Day.— The present Indian schools under government control are day schools, reservation boarding-schools and non-reservation boarding-schools. These in 1916 numbered 324, including both boarding-schools and day schools; pupils are also maintained by contract in white public schools.

Day Schools.— Day schools in Indian villages or settlements are, as a rule, in charge of a male teacher and his wife, or, as in the Pueblos of New Mexico and in the Indian villages of southern California, of a white woman teacher and an Indian housekeeper. These teachers are usually employed for 10 months in the year; the male teacher's wife acts as housekeeper. The children spend five to eight hours during the five days of the week under the care of these employees, and return to their homes in the evening. The instruction is of the simplest character. The children are taught to speak, read and write English within narrow limits, to cipher, to draw and to sing. They get some rudimentary notions of geography, of natural history and of United States history. The methods are borrowed largely from the kindergarten and from object-teaching and much stress is laid upon habits of cleanliness and order, mutual kindliness and prompt obedience. The boys receive some instruction in the use of tools, in gardening and in some instances in the care of cows. The girls are taught sewing, cooking and other arts of housekeeping. In the poorer Indian communities a noon-day lunch of a few simple articles is furnished. While these day schools accomplish comparatively little in conventional schoolroom work, they serve as concrete illustrations of a civilized Christian home which the Indians learn to respect and, in an appreciable degree, to emulate. Moreover, they reconcile the Indian with the idea of sending his children to school, and render him more willing in due time to entrust them to the care of boarding-schools, as well as more ready to appreciate and to accept the lessons of civilization. The most successful of 215 such schools in 1916 were located in Wisconsin, North Dakota and South Dakota; the least successful, probably, among the pueblos of New Mexico, where the Indians live in a state of half-civilization which they owe to their Mexican and Spanish antecedents, and which fully satisfies their ideals.

Reservation Boarding-Schools.—There were 74 of these in 1916, averaging 136 pupils. They are in charge of a superintendent who also has charge of the reservation activities and is assisted by a matron and such teachers, industrial and domestic helpers as the capacity and character of the school may require. In some cases a principal is in direct charge of the school, relieving the superintendent of the detail of management. In addition to regular teachers, the school is provided with a cook, a seamstress and a laundress, whose office it is not only to supervise their respective departments, but also to instruct the girls in these arts. For instruction of the boys there is a farmer, an industrial teacher, and, at larger schools, a tailor, a shoe and harness maker, a carpenter and a blacksmith. An experiment to provide for more methodical instruction in the use of tools, by expert manual-training teachers, failed because the Indian office would not afford a salary for this position sufficient to attract competent men. In 1894 the experiment of connecting kindergartens with these schools was tried, and proved eminently successful. At the present time there are 26 kindergartens connected with boarding-schools, and the use of kindergarten methods and material has entered the primary classes in practically all these schools with similar good results. In the kindergarten the children spend from one and a half to two hours each half-day. In most of the other schools children spend half a day in the schoolroom, and the other half-day in domestic or industrial work of a character suited to their age. Experience has proved that half-day instruction, at first

forced upon the schools as an expedient, is commended by its good results.

The aim of the schoolroom work is to teach reading and writing within the usual limits of primary work; arithmetic for the needs of ordinary daily life; rudimentary geography and United States history; drawing and singing; the laws of hygienic living; garden and orchard work; and familiarity with the simpler requirements of agricultural and domestic industries suited to the locality. Moreover, in a few of the larger schools, the older boys have much opportunity to acquire skill in carpentry, blacksmithing, tailoring and shoemaking. These institutions are to the children not only school, but home and community. The institution gives them shelter, food and clothing; it accustoms them to habits of cleanliness and decency; it cultivates their æsthetic tastes; it labors to secure right moral attitude, and in its Sunday-school seeks to stimulate the religious life of the children.

In 1893, under civil-service regulations, there came some improvement. Still with reference to minor employees the superintendents, and even the Indian office, were powerless and frequently good superintendents were forced out of service by combinations against them among the appointees of the agent, or through the aid and influence of unscrupulous partisan inspectors or supervisors. But in 1896 all employees of the school service were placed under civil-service protection, and since that time there has been marked improvement in the conditions and work of these schools. To a certain degree these evils still persisted, however, because of the power and political bias of the agents; but of late the government has adopted the policy of replacing the agents with bonded school superintendents. There has been decided gain in the equipment, in the sanitary condition, in the general character of employees and in the conduct of the schools. For the Indian office, relieved of attention to office-seekers and their patrons, has been enabled to pay increased attention to the schools themselves. In the reservation boarding-schools instruction continues through 40 weeks; but often some children are kept at the school throughout the year.

Course of Study.— In 1916 a decided step forward was taken by the adoption of a new course of study for Indian schools, covering 10 grades. The predominant feature under this course of study is industrial instruction. The first three years of the course are devoted to primary work. The next three years are spent in prevocational training, and the last four years to vocational training in which instruction in agriculture and allied subjects and household arts is given a prominent place. As a general rule the work of the day schools is limited to the first three years of the course, that of the reservation boarding-schools to the first six years, while in only some of the non-reservation schools is the full 10-year course, with its allied vocational training, given.

Non-Reservation Boarding-Schools.— Of these there are 25. The superintendents of these schools are bonded and directly responsible to the Indian office. The schools are, as a rule, located at a distance from the Indian country, and in the vicinity of American towns which afford contact with the amenities of civilized life. Members of many different tribes are also brought together, and tribal antagonisms are broken down. The pupils are older than those at reservation schools, and some have had previous training in day schools or reservation boarding-schools. Because far away from their Indian homes, and near to English-speaking communities, they gain a better control of English; classroom work reaches far into the advanced grammar-school courses of study, with special stress upon language practice, arithmetic, geography, history, nature study, drawing and civil government. Instruction in domestic and industrial arts is made effective by frequent opportunities directly to observe their practical applicability and value. The principal reservation schools are at Carlisle, Pa.; Lawrence, Kan. (Haskell Institute); Chilocco, Okla.; Albuquerque and Santa Fe, N. M.; Phœnix, Ariz.; Riverside, Cal. (Sherman Institute); Chemawa, Ore.; Tacoma, Wash. (Cushman); Rapid City and Flandreau, S. D.; Genoa, Neb.; Pipestone, Minn.; and Tomah, Wis.

Contract Schools.— In addition to maintaining these strictly government schools, the Indian office up to 1901, as before said, paid by contract for the education of many hundreds of Indian pupils distributed in Catholic mission boarding-schools, at Lincoln Institute, Philadelphia, and at Hampton Institute, Hampton, Va. In the appropriation for that year, the aid was withdrawn from all but the last-named, where 120 pupils were contracted for. Besides these, the government since 1891 has endeavored to place Indians in white public schools where there are many whites and few Indians, as the most rapid means of civilization. The antagonism of local or State authorities to this coeducation has been gradually overcome and the number of children so enrolled is rapidly increasing.

Supervision.— Direction of the Indian schools rests with the Indian office, which is under the supervision of the Secretary of the Interior. In the Indian office the details of the work are entrusted to the education division, to which all reports are made, and by which all directions and orders are drafted and issued. The education division is aided in its work by a force of supervisors and by 21 supervising superintendents. The supervisors act in a general inspecting capacity, and the supervising superintendents are charged with the direct supervision of the schools and the work of the new course of study, particularly the industrial instruction. These supervisors and supervising superintendents have an advisory rather than an administrative status. They consult with the superintendents and employees charged with the duty of giving instruction and report to the commissioner of Indian affairs the extent to which the various schools reach or fall short of reaching the ideals of the course of study, at the same time making recommendations as to the changes needed to raise the standard of the schools.

Schools.— The schools of the so-called "Five Civilized Tribes" of Oklahoma are not included in the above sketch. The five tribes in 1916 included 41,824 Cherokees, 26,828 Choctaws, 18,774 Creeks, 10,966 Chickasaws and 3,127 Seminoles. Missionary zeal had early availed itself promptly of this field for its efforts. Substantial boarding-schools were

erected, more particularly by the Presbyterians, Methodists and Baptists. In due time, however, the Indian authorities began to make appropriations for these schools. Ultimately they took entire charge of them. Unfortunately, administrative affairs were largely in the hands of whites, who, by intermarriage or bribery, had been adopted into the tribes and there came over the schools, as well as over all other public interests, the blight of extreme partisanship and nepotism, which rapidly degraded them in character and efficiency. In 1898 the government at Washington assumed supervisory control over the affairs of all these tribes except the Seminoles. The conduct of the schools and orphan asylums in the four tribes involved was placed under the direction of a superintendent of schools in Indian Territory, appointed by the Secretary of the Interior. Under him there was for each of the tribes or nations a supervisor of schools, whose duty it was to inspect the educational institutions in his district and to assist in their organization and conduct. The superintendent reported to the commissioner of Indian affairs at Washington through the United States inspector for the Indian Territory, who was his immediate superior. The initial report of this superintendent showed in the four tribes 24 boarding-schools, with an enrolment of 1,758 pupils and an average attendance of 1,480, taught and cared for by 234 employees at an annual expense of $236,824. These schools have now been made a part of the general system of schools, except that with the exception of the Cherokee Indian Training School, they are supported by tribal funds of the different tribes and are under the direct supervision of a supervisor for the Five Civilized Tribes. In 1916 there were 10 such schools, enrolling 1,227 pupils in charge of 147 employees. In 1916 there were also 590 pupils enrolled in schools maintained in the Five Tribes' territory and known as mission schools under contracts calling generally for a per capita of $108, but in the cases of two such institutions of $120.

INDICAN, a colorless substance chemically related to indigo, found in wood, in most plants yielding indigo-blue, and in human urine.

INDICATOR, in steam engineering, an instrument invented by James Watt, to record, graphically and automatically, the pressure in an engine cylinder at every point of the stroke. By means of the diagram that the indicator draws, it is possible to determine whether the valves of the engine are working correctly or not, and it is also possible to estimate the horse power that the engine is developing with considerable accuracy. Commercially, the steam-engine indicator may be had in many forms; but all are based on the same fundamental principle, which will be understood by reference to the diagram presented in Fig. 1. The paper upon which the indicator diagram is to be drawn is here supposed to be secured, flat, to a carriage which travels back and forth upon a track; the motion of the carriage corresponding precisely to the motion of the piston of the engine. In practice it would be inconvenient to have the carriage travel a distance equal to the whole stroke of the engine, and hence some form of reducing motion is used, so that the motion of the carriage may follow the motion of the engine piston accurately, but with materially reduced velocity. The indicator diagram is drawn by means of a pencil-point carried on the piston rod of a small steam cylinder which is situated below the carriage, and which opens freely into the cylinder of the engine from

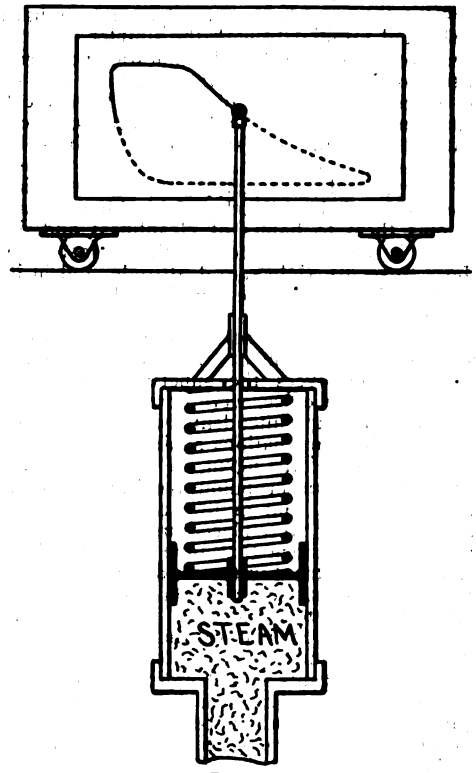


FIG. 1.

which the diagram is to be taken. The piston of the indicator is pressed downward by means of a spring whose strength is accurately known, so that the increase of pressure corresponding to a rise of one inch in the position of the pencil-point is known. When the indicator is in operation, the pencil rises and falls proportionately to the pressure of the steam in the

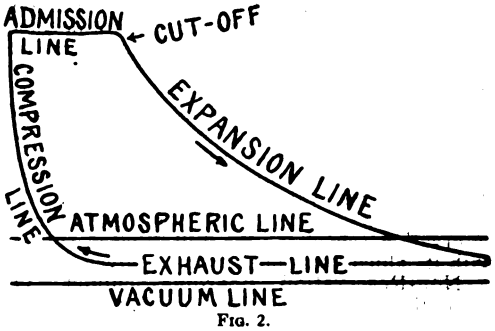


FIG. 2.

engine cylinder, and the carriage, with its attached paper, travels back and forth horizontally, at the same time, keeping pace precisely with the motion of the piston of the engine. Under these circumstances the pencil-point

traces a diagram somewhat like that shown in the illustration. In practice, the paper upon which the diagram is drawn is usually wrapped about a cylindrical drum, which by rotating presents a new surface of paper for a new diagram. It follows the motion of the engine piston just as the carriage here shown. In Fig. 2 an enlarged view of an indicator card (or diagram) is given, together with the technical names of some of its more important parts. The arrows show the direction in which the pencil travels as the diagram is drawn. The "admission line" is the part that is drawn while the engine is in full communication with the boiler, and drawing steam from it. The angle marked "cut-off" corresponds to the instant at which the steam supply is cut off, and the expansion of the steam begins. The "expansion line" is drawn during the expansion of the steam; and on the return stroke, after the exhaust valve has opened, the "exhaust line" is drawn. When the exhaust valve has closed again, the steam remaining in the engine cylinder is compressed until the end of the stroke, the indicator meanwhile drawing the "compression line." The "atmospheric line" is the straight, horizontal line drawn by the engine when the connection is broken between the engine cylinder and the indicator cylinder, and the latter is open freely to the air. The "vacuum line" is the line that would be drawn by the instrument under like circumstances, if a perfect vacuum could be maintained in the indicator cylinder. The "vacuum line," of course, must be drawn in by hand. It is parallel to the "atmospheric line," and at a distance below it corresponding to a pressure of about 14.7 pounds per square inch, on the scale to which the diagram is drawn. The diagram shown in Fig. 2 refers to a condensing engine. In a non-condensing engine, the exhaust line would not be lower than the atmospheric line, and would, in fact, be above it, if there were any sensible back-pressure in the engine during exhaust.

A considerable number of other mechanisms are termed indicators, as the stock-indicator, a receiving telegraph instrument that prints on an endless tape the figures, etc., of stock sales telegraphed; telegraph indicator, a telegraphic instrument having a vertical needle making indications on a dial, called also needle telegraph; circuit indicator, an upright galvanometer or the like for indicating the presence and character of an electric current; speed indicator, a gauge having usually a dial and pointer for indicating visually the speed of a machine, etc.; track-indicator, a registering device for mounting on a railway car or locomotive to record the variations of the track from accurate level and alignment.

For detailed information concerning the steam-engine indicator and its uses, consult Pray, 'Twenty Years with the Indicator'; Peabody, 'The Steam Engine Indicator'; also, for less extended treatment, any good book on steam engineering.

INDICTION, a period or cycle of 15 years. The origin of indiction as a chronological period is not known. Several writers have propounded theories explanatory of its origin, none of which are supported by any evidence. In the time of Athanasius it came into favor among ecclesiastical writers. Being adopted by the Popes, it came into general use during the Middle Ages. The time from which reckoning by indictions began is, according to some, 15 Sept. 312; according to others, 1 Sept. 312; but when this method was adopted by the Popes, it was ordered to be reckoned as beginning 1 Jan. 313. The latter only is now used, and is called the Papal Indiction. If we reckon backward to the beginning of the Christian era, it will be found that 1 A.D. corresponds to the fourth year of an indiction — hence, if to any given year of the Christian era three be added, and the sum divided by 15, the remainder will give the position of that year in an indiction — e.g., 1918 was the first year of the 108th Papal Indiction.

INDICTMENT, in-dīt'mĕnt, a formal written charge made before a legal tribunal against an accused person or persons. The essential requisites of a valid indictment are — first, that the indictment be presented to some court having jurisdiction of the offense stated therein; second, that it appear to have been found by the grand jury of the proper county or district; third, that the indictment be found a true bill, and signed by the foreman of the grand jury; fourth, that it be framed with sufficient certainty; for this purpose the charge must contain a certain description of the crime or misdemeanor of which the defendant is accused, and a statement of the facts by which it is constituted, so as to identify the accusation; fifth, the indictment must be in the English language, but if any document in a foreign language, as a libel, be necessarily introduced, it should be set out in the original tongue, and then translated showing its application, 6 Term. 162. The formal requisites of an indictment are: First, the venue, which at common law should always be laid in the county where the offense has been committed, although the action be in its nature transitory, as in case of a battery. The venue is stated in the margin thus: "City and County of ——, to wit." Second, the presentment, which must be in the present tense, and is ordinarily expressed in the following formula: "the grand inquest of the State of ——, inquiring for the city and county aforesaid upon their oaths and affirmations present". Third, the name and addition of the defendant; but in case an error has been made in this respect, it is cured by the plea of the defendant. Fourth, the names of third persons, when they must be necessarily mentioned in the indictment, should be stated with certainty to a common intent, so as sufficiently to inform the defendant who are his accusers. When, however, the names of third persons cannot be ascertained, it is sufficient, in some cases, to state "a certain person or persons to the jurors aforesaid unknown." Fifth, the time when the offense was committed should, in general, be stated to be on a specific year and day. In some offenses, as in perjury, the day must be precisely stated, but although it is necessary that a day certain should be laid in the indictment, yet in general the prosecutor may give evidence of an offense committed on any other day previous to the finding of the indictment. Sixth, the offense must be properly described. This is done by stating the substantial circumstances necessary to show the nature of the

crime, and next the formal allegations and terms of art required. As to the substantial circumstances: the whole of the facts of the case necessary to make it appear judicially to the court that the indictors have gone upon sufficient premises should be set forth; but there should be no unnecessary matter, nor anything which on its face makes the indictment repugnant, inconsistent or absurd.

According to the rules of pleading in criminal actions at common law there are certain terms of art used, so appropriated by the law to express the precise idea which it entertains of the offense, that no other terms, however synonymous they may seem, are capable of filling the same office; such, for example, as traitorously in treason; feloniously in felony; burglariously in burglary; maim in mayhem, etc. In New York, and in nearly all of the States which have adopted the code system, the common-law rules of pleading in criminal actions have either been greatly relaxed or entirely abolished. Many of the statutes of the subject are similar to the New York statute, Code Crim. Pro. § 273, which in substance provides that all common-law rules of pleading are abolished, and the forms of pleading prescribed by the code shall be substituted, and § 275 of the same code provides that all an indictment must contain is the title of the action, specifying the name of the court to which the indictment is presented, and the names of the parties, together with a plain and concise statement of the act constituting the crime, without unnecessary repetition. It is also provided in § 283 of the New York Code Crim. Pro. that words used in a statute to define a crime need not be strictly pursued in the indictment; but other words conveying the same meaning may be used.

INDIFFERENTISM, a system or state of indifference; specifically in metaphysics and ethics, the theory of a school of philosophers that the human will acts in utter indifference to all motives, and chooses merely as a judge decides. It is opposed to determinism. See Ethics; Free Will.

INDIGESTION. See Dyspepsia.

INDIGIRKA, in'dye-ger'ka, a river of Siberia, in the government of Jakutsk. It rises in the Yablonoi Mountains and after a northerly course, estimated at 850 miles, through a frozen desert past a few villages, falls into the Arctic Ocean in lat. 71° N., and long. 150° E. It is closed to navigation during the winter months.

INDIGO, the name of a genus of plants, and of the blue coloring matter obtained from them. The indigo plants are tall herbs of the pea family, forming the genus *Indigofera,* of which there are several color-yielding species in various warm parts of the world. The one yielding the indigo of commerce, and formerly extensively cultivated, is *I. tinctoria,* which is native to India, grows five feet high and has pinnate leaves. The coloring matter most abounds in the leaves, and especially at the time of flowering, and that is the time when the crop is gathered by cutting down the plant, and making immediate use of the green stems or foliage, or by drying them for subsequent treatment. This coloring matter is a chemical substance called *indican,* the glucoside of indoxyl, which is converted by oxidation into indigo. Until the discovery of the sea-route to India the only blue vegetable dye available in Europe was that derived from the woad (q.v.), which was limited and costly; this dye-substance was therefore regarded as one of the most valuable of new commodities and a large capital was soon invested in its cultivation in India, Ceylon, China and other regions, where a profitable industry continued until after the middle of the 19th century. The indigo is obtained by macerating the leaves and stems in vats for several hours. Fermentation arises and the water becomes clear yellow. It is then run off into a lower basin, where it is subjected to incessant agitation and gradually turns green, whereupon the indigo begins to form in flakes and settle. The residuum is then thoroughly boiled, filtered through linen, molded into small cakes, and dried. The best quality comes from Bengal and eastern India. Indigo plantations were made with more or less success in Brazil, Central America and Mexico; and one of the foremost inducements held out to settlers in the southern colonies, from Maryland to Louisiana, was the probability of its successful cultivation there. The experiments never yielded results of much importance, partly because crops of tobacco, cotton and foodstuffs were more profitable. Since the discovery of cheap methods of forming blue dyes from coal-tar the cultivation of indigo has declined greatly, but still supplies a steady demand from cloth-dyers who wish an imperishable blue of certain tints.

The wild indigo of the United States is any of several species of a closely related genus *Baptisia,* which flourishes especially in the Southern States. The best known is the yellow-flowered false indigo (*B. tinctoria*), or indigo brown, from which country people obtain a blue dye and a domestic medicine.

Indigo Dyeing.— Before it can be employed in dyeing, the indigo must be brought into solution; and as indigo itself is insoluble, it must be first transformed into a soluble substance, so that it can penetrate the pores of the cloth, where it is subsequently again restored to the form of indigo. To bring the indigo into solution it is ground up to a soft paste with water, after which it is thrown into vats along with ferrous sulphate, slacked lime and water. The ferrous sulphate reacts with the lime to form calcium sulphate and ferrous oxide, the latter being immediately oxidized at the expense of part of the oxygen of the indigo, which in its turn is reduced to a substance called indigo-white. This dissolves in the presence of excess of lime, and the fabric to be dyed is dipped into the vat after the liquid in it is clear. On removing the fabric the indigo-white which has penetrated its pores is reoxidized by the air to indigo-blue; and by repeating this treatment a shade of blue of any desired depth may be obtained. The dyed fabric is finally passed through dilute acid to remove any adhering lime or ferric oxide. Indigo appears to exist in the plant in the form of a glucoside known as "indican," which has the formula $C_{52}H_{62}N_2O_{32}$, and to be developed from this glucoside in the course of the fermentation by the action of a special bacillus, which closely resembles the bacillus of pneumonia. Indigo is now made artificially, the total production of synthetic

indigo being probably about one-fourth of the world's consumption. Although artificial indigo-blue appears to have the same chemical formula ($C_{16}H_{10}N_2O_2$) as the natural product, and to be identical with it in every way, it is more expensive than the natural product at the present time. If it could be made more cheaply it would work as great a revolution in dyeing as did the introduction of alizarin in the place of madder. See COAL TAR COLORS and the references there given.

INDIGO-BIRD, a numerous and beautiful North American finch (*Passerina cyanea*), the male of which is dark greenish blue, while the female is grayish brown. They are migratory, but in summer spread over most of the United States, placing their neat nest and unspotted bluish eggs in garden bushes as well as in wild thickets. The male has one of the brightest and most persistent songs of any American bird, and he is easily habituated to captivity.

INDIGO SNAKE. See GOPHER SNAKE.

INDIRECT DAMAGES, claims for damages not directly inflicted by the illegal act complained of, but by other causes themselves due to that act. The great historical case is that of the United States claim for many hundreds of millions of dollars' worth of loss, resulting from Great Britain's bad faith or carelessness in letting the *Alabama* (q.v., and ALABAMA CLAIMS) escape from her ports to prey on our commerce. It was alleged that aside from the actual loss to our shipping and cargoes, we had been damaged to a far greater extent by the resultant effects, chiefly of three sorts: (1) The prolongation of the Civil War due to the encouragement given to the South and the straitening of the North. (2) The destruction of commercial lines and relations, which took long to recover after the war. (3) The raising of the rates of marine insurance. As these claims exceeded the cost of a war plus the indemnity we should have exacted if victorious, Great Britain refused to consider them; and the commission threw them out altogether as contrary to international law.

INDIRECT ELECTIONS. See ELECTIONS; ELECTORAL QUALIFICATIONS; CONGRESS.

INDIUM, in organic chemistry, a metallic element of a silver-white color, discovered by Reich and Richter through spectroscopic analysis during 1863 in the Freiberg arsenical ores. It is very rare. It is related to cadmium and zinc, and both are associated with it in nature; but it is found in many ores beside, although especially in zinc blende. This metal is obtained by heating the oxide with carbon and by other methods. It is soft, malleable and easily fusible. Its distinguishing property, however, and the characteristic which led to its discovery, is the indigo-blue line which all its compounds — so far as investigated — show in the spectroscope. The spectrum of indium exhibits two characteristic lines: one violet line α, and another blue line β; and besides these two fainter blue lines are visible if the burner in which the metal is volatilized be fed with hydrogen instead of coal gas. This metal is obtained by heating the oxide with carbon and by other methods. Its specific gravity is 7.1–7.4; its symbol In; and its atomic weight 114.8. It melts at 174° C. (= 345° F.). Chemically, indium resembles aluminum and gallium, being chiefly trivalent.

INDIVIDUAL PSYCHOLOGY. This term is applied to that branch of psychology which deals with the mental variations of individuals from one another. It is thus contradistinguished from general psychology, which undertakes to determine the facts and laws of conscious processes as a whole and without special reference to their peculiar manifestations in any particular persons or group of persons. The field of individual psychology may be regarded as a part of the larger field of variational or differential psychology in which are to be included studies upon special races and upon social groups of various sorts. Such studies are carried on with special reference to detecting and describing the characteristic mental traits of such groups, but often with little emphasis on typical variations from other similar groups. Obviously the range of problems in individual psychology must be as broad as mind itself, for persons may vary in regard to any mental characteristic. It will only be practicable to mention a few of the problems thus far investigated, e.g., mental type, temperament and genius, the psychology of special mental defect, the psychology of the criminal, the psychology of sex, and that of professions or classes with their peculiar variations of mental constitution.

To exhibit more concretely the kind of material with which individual psychology works we may comment briefly on the first three of these topics. The determination of *mental type* is a problem of individual psychology in the narrow sense of the term in so far as it has to do with the ascertaining of the characteristic features of the mind of any particular person. In so far as it bears on the problem of discovering what actually are the typical groupings of such characteristics among people in general, it obviously belongs to the broader field of variational psychology.

1. Minds may differ from each other as regards the delicacy or sensitiveness with which they respond to stimulations of the sense organs. One may be more sensitive than another to slight variations in temperature, in color, in tone, etc. As a matter of fact, among normal persons such differences of sensitivity are relatively slight when the conditions of training and discipline are similar. As a general rule the higher mental functions show more variation than the lower one such as sensitivity. Minds may differ as regards the special form of sense material toward which they manifest a predilection, e.g., the musically minded person not only finds sounds of greater emotional interest than the unmusical person, but he also has a better memory for auditory experiences and his conscious processes in their entirety are likely to be much more influenced by auditory factors. A further development of such mental preference for one or another kind of sense material is found in the fact that certain individuals carry on most of their thought processes in terms of visual images, whereas others employ auditory images, and still others motor images. Probably the normal condition is represented by an admixture of various forms with some particular group dominating slightly over the others. Again, in memory we

meet striking differences in addition to those of the imagery type already mentioned. For example, certain persons learn very rapidly and also forget rapidly. Others learn with difficulty but retain well that which they have learned. Occasionally we find persons who combine ability to learn quickly with capacity to retain permanently. It seems certain from psychological investigations that individuals supposed to possess particularly good memories are generally proficient only in certain directions. A universally efficient memory is rarely, if ever, found. People differ also very markedly as regards their ability to concentrate their attention. Some persons can concentrate very intensely for a short time but must then rest. Others are able to focalize for more extended periods, and still others find it all but impossible ever to secure any intense concentration. Variations of a striking kind are also disclosed in the formation of judgments. Certain persons judge almost entirely in accord with the objective facts presented to their notice. Others are influenced in various degrees by subjective influences and show themselves peculiarly susceptible to suggestion. It is a matter of common observation that persons vary radically as regards temperament and feeling. One of the most practically important variations is represented by the difference in the rate at which the conscious processes proceed. Just as certain persons naturally walk and talk more rapidly than others, so do the mental processes vary as regards the speed with which they occur. Psychologists have demonstrated a rather characteristic daily variation as regards both rate and efficiency of mental activity. Many persons work best at night. Others are morning workers and still others afternoon workers.

2. The old familiar classification of temperament recognizes the four types: sanguine, melancholic, choleric and phlegmatic. Both the choleric and the sanguine are supposed to be subject to rapid oscillations of emotional interest, but with the sanguine individual, interest is rarely intense, whereas with the choleric it is rarely anything else. The melancholic and the phlegmatic represent the more persistent and dogged forms of interest but, like the previous pair, are distinguished by differences in the intensity of the interest, the phlegmatic person being less, the melancholic more, intense. These classifications are likely to be extensively revised by current investigation.

3. The modern study of genius has not only contributed to a more definite conception of the nature of genius and the general mental characteristics of the remarkable individual, but it has also revealed the hereditary character of marked intellectual superiority, and the relation between certain types of genius and mental defect.

Galton has gathered statistics to show that the frequency of genius is related in a definite and orderly way to the total number of persons in any given group. He has also shown that the genius appears with a background of heredity which affords a reasonable explanation of his peculiar characteristics. The view often urged by such writers as Lombroso that genius is essentially a morbid and degenerate mental phenomenon seems to be sound only in so far as concerns the *liability* of persons of remarkable mental qualities to nervous derangement of various sorts. That insanity itself and genius are in any intrinsic sense identical is not generally granted. Among the interesting problems which deserve further study in the case of genius may be mentioned the determination of the extent to which the genius owes his superior endowment to heredity, as contrasted with education and favorable nurture; the ascertainment of the conditions which hinder or encourage the development of genius; the discovery of the general mental types to which the various remarkable individuals conform.

Bibliography.— Binet and Henri, 'Année Psychologique' (II, 1896, p. 411); Stern, 'Psychologie der individuellen Differenzen'; Galton, 'Hereditary Genius'; Tarde, 'La Criminalité comparée'; Ellis, 'Man and Woman'; 'Studies in the Psychology of Sex'; Thompson, 'Mental Traits of Sex.'

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INDIVIDUALISM, a regard for and emphasis of the individual. A belief in personal independence and self-sufficiency. In ethics, those doctrines which dwell upon individual welfare rather than social welfare, and determine their standards of conduct by the dictates of individual feeling. Under these views, it is taken for granted that if each individual seeks his own highest welfare, social welfare will take care of itself. Individualism is opposed to socialism and finds defense in the works of John Stuart Mill and Herbert Spencer. It becomes the duty of the state, under this conception, not to interfere with the individual except when it is necessary to preserve the opportunity for action. The function of the state is regarded as an artificial restraint, while individual initiative is a natural factor in evolution. From an economic point of view individualism favors the policy of *laissez-faire* (q.v.). Consult Domisthorpe, 'Individualism: A System of Politics' (London 1889); Eliot, C. W., 'Conflict between Individualism and Collectivism in a Democracy' (New York 1910); Fite, W., 'Individualism' (ib. 1911); Fournière, 'Essai sur l'individualisme' (Paris 1901); McKechnie, 'The State and the Individual' (Glasgow 1896); Tufts and Thompson, 'The Individual and his Relations to Society, as Reflected in British Ethics' (Chicago 1898).

INDIVIDUALITY, a separate and distinct existence. The fact that one thing may be distinguished from all others gives individuality its meaning. Whether the distinction is only relative or is absolute is disputed among philosophers. The problem arises out of the difficulty of thinking of any distinctive character of an individual, except its location in space or time, without using general concepts. With Plato the universals alone were real. With Aristotle reality was found in the concrete individual and the universal stood only for an abstraction. The same problem occurs in mediæval times, in the discussion of the relation of God, Trinity and man, and in modern times in the question of the relation of the individual to society. For other views of individuality consult Driesch, 'Science and Philosophy of the Organism'

(London 1908), and Huxley, 'The Individual in the Animal Kingdom' (Cambridge 1912).

INDO-CHINA, the southeastern peninsula of Asia, formerly known as Farther India, including Anam, Burma, Cambodia, Cochin-China, French Indo-China, Tongking (qq.v.) and other districts.

INDO-CHINESE, generic name of the native population of Farther India, most of whom belong to the southern branch of the Mongol division of mankind, and speak monosyllabic toned languages of the Indo-Chinese linguistic family. They came partly from the Tibetan plateau (Burmese, Arakanese), and partly from South China (Shans, or Laos, Siamese, Annamese). Besides these there is a considerable Caucasic element, numerous especially in Cambodia, where the dominant people are the Khmers of polysyllabic untoned speech. To the same element belong also the Chams of Lower Cochin-China, perhaps the Talaings of Lower Burma, and numerous smaller groups on the eastern coast range, and along the uplands between the peninsula and South China. Like Hindustan, Farther India has a history of primitive civilization. (For details see ANAM; BURMA; COCHIN-CHINA; SIAM). Consult Clifford, H. C., 'Farther India' (New York 1904).

INDO-EUROPEANS. See ARYAN RACE; ARYAN LANGUAGES; INDO-GERMANIC LANGUAGES; IRANIANS; IRANIAN LANGUAGE AND LITERATURE.

INDO-GERMANIC LANGUAGES comprise that group of languages which took their rise in India and Iran and which now, by common consent, with a few slight exceptions, include all the tongues spoken in Europe. There are seven principal branches coming under that head, namely: (1) Germanic; (2) Slavo-Lettish; (3) Celtic; (4) Italic; (5) Greek; (6) Iranian; (7) Indic. It is beyond question that all these idioms together are descended from one common root, the Aryan proper. Internal evidence in favor of this statement is too strong to be rejected. The structure shows it; the stock of words shows it; the number of features in common show it; and finally the sounds themselves show it. Comparative philology has demonstrated beyond cavil that only by assuming a common origin can the fact be accounted for that the most ordinary words and the basic part of grammar — the rough framework of language so to speak — are practically identical; such as the personal pronouns, nouns like mother, father, brother and sister, the earliest domesticated animals and the most indispensable primitive foods and appliances, as the plow; the most necessary verbs, particularly the auxiliaries. The differences between the several languages belonging to the Indo-Germanic, or Aryan, group, as, for instance, between Russian and German, Polish and English, Italian and Lithuanian, are many, in varying degree, but are simply somewhat greater than those, let us say, between cognate idioms, such as Dutch and German, French and Italian, Czech and Jugoslav, or Hindu and Persian. Or rather, the degree of similarity differs. But the structural similarity between all is undeniable. All Indo-Germanic languages, too, are inflectional.

It is agreed that the entire body of the Aryan languages is derived originally from monosyllabic elements, and that of these there were two classes, verbal and pronominal, and that combining these two grammatical forms there arose gradually the rudiments of grammar and of vocabulary. In some of the Aryan tongues there have lingered forms which in the others had disappeared at an earlier date, such as the dual; the future of the verb came later and was made up with auxiliaries; the imperative existed at first only in the second person. Verbs in all of these idioms were originally of primitive structure; some of the refinements of grammar, such as the subjunctive, are doubtful in their derivation; declensional inflections, on the other hand, were in olden days rather more complicated, having three numbers and eight cases, including one denoting instrumentality and one locative; sex distinctions, too, were indicated by the endings of cases. From this complex stage the tendency has been throughout toward simplification. Relative pronouns were late in appearing, growing out of demonstratives or interrogatives; articles came to view not until a late period; numerals for long ran only up to 100. Of all the Indo-Germanic, or Aryan, tongues Sanskrit has preserved most of the original standards. Many, nay, the largest part of the changes wrought were due to phonetic influences, such as in English *sing, sang, sung, song;* or as in Latin *fid, fido, foedus;* in the Greek λειπω, ελιπον λέλοιπα.

Necessarily, the close correlation of the Indo-Germanic idioms presupposes a common origin, the existence at some remote period of one united, and in numbers and territory held, rather limited mother tribe, within which the root idiom must have had time to grow and develop. Not only is there linguistic proof of this of the strongest kind, but the further fact that there was a common cycle of sagas, myths and legends of prehistoric heroes, of folklore and of archaic godlike beings worshipped, tends altogether in the same direction. Again, that the Indo-Germanic race derives from the same parent tree is proved by the indisputable fact that it is this race which throughout all historical time has been pre-eminent; first, the Persian, next the Greeks and Romans, and then the nations of modern times. In the main they did this because possessing the same set of qualities.

All the records, however, available do not go farther back than about B.C. 3000, and indicate the Pamir region or the Punjab as the pristine home of the Indo-Germanic stock. The Vedas in their most ancient portions are not older than 2000 B.C. A number of Indo-Germanic idioms amalgamated with others, or disappeared, like Gallic, Etruscan, Burgundian, Scythian, Mesapian, Pelasgian.

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INDO-IRANIAN LANGUAGES. See IRANIAN LANGUAGE AND LITERATURE.

INDOOR BASEBALL, a variety of the regular game, played indoors as the name indicates. It is played in a hall at least 40 × 50 feet in extent, with a white ball not over 17¼ inches in circumference. If space does not permit, two outfielders are dispensed with, leaving seven men on a side. The maximum diameter of the bat is 1¾ inches. The rules are similar to those governing the outdoor game with the exception of the limitations imposed by the walls, floor, etc. The special sizes of bat and ball are designed to make the chances and conditions in the game approach as closely as possible those of the regular game. The National Indoor Baseball Association formulates the special rules governing the sport. Consult 'Indoor Baseball Guide' (in Spalding's Athletic Series.' New York, annually).

INDORE, in-dor', India, a Mahratta native state in the Central India Agency. It has an area of 9,469 square miles, covered with great forests, in which many large wild beasts roam. It is watered by the Nerbudda River and is crossed by a portion of the Vindhya mountain range. The land produces, in addition to the valuable timber of the forest areas, cotton, tobacco, sugar-cane, maize and wheat. Opium is also produced in large quantities. Title to the land rests in the state, which rents it to the population. A portion of the population, the Bhils, is the wildest and least cultured of India. The state is ruled by the Holkar. The chief centres of population are Rampura, Mehadpur, Mhow and Bhampura. Pop. 1,004,569. The capital is Indore, a city 440 miles east of Bombay, at the confluence of the Khan and Saraswati rivers. It contains the palace of the Holkar, government buildings, a mint, military barracks and Daly College. It has a good water-supply system and a modern sewage system. Cotton is manufactured. There is a large trade in opium, grain, tobacco and other products of the region. A region in the suburbs has been allotted by treaty to the British resident agent and his staff. Pop. 44,947.

INDORSEMENT, *in law,* the act of writing or printing on the back of a written instrument, or that which is written or printed thereon. It is more particularly applied to the signature usually on the back of a negotiable instrument by which the title thereto is passed. Such signature must be that of the legal holder of the instrument, which must be delivered, or else be acquired by a bona-fide holder, to make it valid. A holder who places an indorsement on a negotiable instrument thereby assumes the obligation to pay the amount therein named if payment has been refused after being duly demanded, provided due notice is given him of the previous dishonor of the instrument. An indorsement is in blank when the indorser signs his name only; an indorsement is special when it specifies the person to whom or to whose order the amount named in the instrument is to be paid. An indorser can avoid personal liability by adding "without recourse" to his indorsement.

INDRA, a Hindu deity especially worshipped in the Vedic period of the Hindu religion, but had great legendary popularity also in the Epic and Puranic periods. In old Vedic poetry he is represented as a mighty ruler of the bright firmament and his principal feat is the conquest of the demon Vr'itra, a symbolical personification of the cloud which obstructs the clearness of the sky, and withholds the fructifying rain from the earth. Indra is the upholder of heaven, earth and firmament and the god who has "engendered the sun and the dawn"— the Jupiter Pluvius of India. See INDIA-RELIGION; VEDIC LITERATURE; and consult Dawson, 'Hindu Mythology' (London 1879); MacDowell, 'Vedic Mythology' (Strassburg 1897), and Wilson, 'Hindu Mythology' (new ed., London 1900).

INDRE, France, a department of central France, once included in the old divisions of Berry, Orleanais, Marche and La Touraine. It has an area of 2,664 square miles; is watered by the Indre, the Creuse, the Anglin and the Vienne. A great part of the area is reclaimed land and about 80 per cent of the total area is cultivated. Barley, wheat and grapes are the principal crops. Stock-raising also is important. Cloths, hosiery, paper, porcelain and farm implements are manufactured. Iron is mined in small quantities. The capital is Châteauroux. Pop. 287,673.

INDRE, France, a river which rises in the department of Creuse, flows in a northwesterly direction through Indre and Indre-et-Loire and debouches into the Loire 15 miles below the city of Tours. Its total length is 136 miles, for 40 of which it is navigable for light-draught vessels. La Châtre, Châteauroux and Loches are the principal towns along its banks.

INDRE-ET-LOIRE, France, an inland department of the republic, formed out of the ancient provinces of Touraine, Pitou and Anjou, northwest of Indre (q.v.). It has an area of 2,377 square miles of which about 1,300 are arable. It is traversed or watered by the Loire, Cher, Indre and Vienne, all navigable for vessels of light draught. Levees protect the land from the overflow of the Loire. The southern part is mostly waste land. Wine is the chief industry. Iron, powder, textiles, leather and silk are manufactured. There are three arrondissements — Tours, Chimon and Loches. Tours is the capital. Pop. 341,205.

INDUCTION, *in logic,* that method of reasoning which establishes general laws or

specific predictions of future, present or past facts on the basis of individual experiences. It is the type of argument by which, let us say, the law of universal gravitation is demonstrated on the basis of observations as to the mutual attraction of certain given bodies, or by which an insurance company is able to determine a safe price for future policies on the basis of past statistical tables, or by which the geologist may describe the history of a certain drainage system through his knowledge of the present status of the system and of the modifications taking place in the drainage systems of the present time. Induction differs from deduction not only in that it starts from particular facts rather than general laws, but also in that the propositions derived by an induction (not covering every single case of the law it sets out to establish) never even appear to have that apodictic certainty which we naturally attribute to the results of correct deduction from indisputable premises. An induced conclusion is only *probably* true; furthermore, if it is at all precise in its terms, it is in general only *approximately* true. The probable correctness of the successive digits of a decimal fraction obtained by inductive reasoning falls off with amazing rapidity. A number, the first nine digits of which are all but absolutely certain, may well have a highly probable 10th digit, a likely 11th and an absolutely worthless 12th.

Induction, then, is the probable and approximate demonstration of laws or predictions on the basis of concrete experiences. It is *not* what it has been considered by Hume and the other 18th century British empiricists: the formation of general ideas — i.e., universals — from mere particulars. In the first place, a universal is not a universal law, nor is a fact a particular. But furthermore, we do not form the notion of red by looking at this red thing and that, and abstracting from them their common quality, nor by associating with the image of one red thing all our past experiences of red objects. There are an endless number of attributes possessed by a group of things, and even exclusively possessed by this group. Redness can only be one of these. When we see the group we recognize redness either as the color quality they possess in common or as their simplest common attribute, or because redness is the property that most attracts our attention. In all these cases we must have a concomitant or antecedent consciousness of a universal — of color, simplicity or redness itself. The process described by the British empiricists simply does not exist, and every formation of a general notion from experience involves an existing awareness of general notions. That is, notwithstanding the contrary opinion of the nominalists, the general notions of qualities and relations which enter into the presentment of inductive laws are not mere mosaics of particular sense data. In a like manner, the inductive laws themselves are not mere mosaics of particular facts. A very common expression among inductive logicians, due to J. S. Mill, is "the uniformity of nature." We are justified in proceeding from this fact and that fact and the other fact to the general law subsuming them all because nature is uniform. This principle of the uniformity of nature has two very different meanings. It may be little more than a tautology or it may be the cardinal law of natural science — or all science, for the matter of that. If the uniformity of nature means simply what it says, it means merely that two occurrences can never agree in all but one aspect and disagree in that one. Now, as even an approximately complete inventory of the aspects of an occurrence is never at our disposal, and since moreover the temporal and spatial position of an occurrence must be considered in enumerating its aspects, this law tells us, for all practical purposes, absolutely nothing. Nature might be perfectly uniform, even though the jumping of a flea should determine the motions of the planets; the establishment of astronomical laws, however, would be a somewhat difficult pursuit.

The uniformity of nature, as the scientist understands it, is much more than this. It could be called more appropriately the continuity of nature. Perhaps it is best to consider it in the form which it assumes in the Newtonian physics. In the Newtonian physics, the world is completely described when the density of the matter occupying each point of space at some instant is known, together with the magnitude and direction of its velocity. The investigations of physics consist then in determining the actual form of the relation between quantities representing time, space, local density, direction and magnitude of velocity. In the attempts to discover the function which the time forms of the remaining seven variables, one assumption is always made — that this function is in general (i.e., in the language of the mathematician except at a set of points of zero measure) what the mathematicians term *analytic*. One consequence of this is that the function is continuous — i.e., by making sufficiently small changes in the seven variables, we may make the difference of time that results smaller than any assigned quantity, and keep it smaller. Furthermore, if we take a large number of experimental determinations of the time and the other seven variables, it is possible to construct a unique function of the seven variables which will represent the time at each of these points and which, by simply increasing the number of experiments, may be made to differ from the function representing the actual course of phenomena by less than any assigned quantity over any desired period of time. Two things follow: first, sufficiently slight errors in the observations only mean slight errors in the law covering the observations; secondly, by increasing the number of observations, it is possible to render the maximum error in the law formulated to cover them less than any given value. These facts assure us that by taking a sufficient number of observations, and by exercising a sufficient amount of care in each observation, we may approximate as near to the truth as we desire. That the amount of labor in obtaining a reasonable approximation is not beyond all human powers is an article of faith which may be said to constitute a part of what we mean by the law of the uniformity of nature. Other important elements have to do with the spatial distribution of phenomena. Not only the very small, but also the very remote, is inaccessible to observation and measurement. The existence of a scientific physics depends on our ability to neglect the phenomena at sufficiently great astronomical distances. Similar propositions assuring us of the negligibility of that

which is sufficiently difficult to observe are basal for other aspects of physical theory.

The law of the uniformity of nature in physics then involves something like the following aggregate of statements: (1) There is a single equation subsisting between the time, the density of matter at every point of space at the time, and the direction and magnitude of velocity at that point. (2) This equation is such that each of the unknowns involved is in general an analytic function of all the rest — that is, among other things, that sufficiently small changes in the other unknowns produce only slight changes therein. (3) The error as to the occurrences near us made by considering only those physical phenomena within a sphere of finite radius with ourselves at the centre ultimately decreases very fast as the radius of the sphere increases.

If these statements are taken together with rough estimates of the order of magnitude of the change that the changes of some of the physical phenomena mentioned in 2 and 3 entail in others, we have the barest outline of the law of the uniformity of nature as it is found in physics. This law is very far from being a tautology — it is not even obvious. Furthermore, it is specifically a law of physics, and has only been established since the time of Newton by inductive physical researches. Other disciplines, such as psychology, have related but different laws of uniformity. They all involve statements of the continuity of certain concrete phenomena. It appears, then, that induction demands antecedent universal propositions that are not identically true — *ex puris particularibus nil concluditur* is not confined to deduction. These synthetic propositions, a priori at least in part, go back and back until in the last analysis they are due simply to a general consonance between the human mind and the facts of nature. This consonance, which consists largely in a preference for continuity both on the part of the mind and of nature, is continually rendered more perfect by the attrition of our imaginings in the places where they disagree with our observations. The history of science consists in a gradual remodeling of each theory in the points where it is wrong, in a mathematical treatment of the errors of the last mathematical treatment. It will be seen that in the theory here developed the distinction between induction and deduction is not absolute, but is rather one of degree and attitude. The stages of an inductive research are: (1) the imagination of a theory to fit the facts; (2) the deduction of the consequences of the theory; (3) the verification of these consequences and the observation of their errors; (4) the imagination of a theory to account for the errors of the original theory or the formulation of a new theory avoiding these errors. The process runs through a regular never-ending cycle. Stages (1) and (2) are identically those of the mathematician in his purely deductive reasoning. Stages (3) and (4) may be paralleled in a mathematical research where the object is the formation of an algorithm which will subserve an especial end. The only difference is that the verification which the mathematician makes is complete, that of the physicist incomplete.

The importance given to continuity in this article may be expressed by saying that the chief inductive method of the scientist is what Mill calls the method of concomitant variations. Mill's canon for this method is: "Whatever phenomenon varies in any manner wherever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation."

It will be noted that Mill gives a causal interpretation to the method. It has always been the custom of the philosopher, and almost never the custom of the scientist, to interpret the laws of nature under the aspect of cause. A law of nature is simply a more or less precise formula to which occurrences conform. Sometimes, and only sometimes, the correlated phenomena will have a temporal order, and we may talk of antecedents and consequents. In such a case the antecedents may be called causes and the consequents effects. This implies no obscure effective force emanating from the cause and proceeding to the effect — Hume demolished that notion long ago. A causal interpretation of the universe, then, consists merely in selecting one especial type of inductive correlation and elevating it to the type of all induction whatever.

Causal language is particularly adapted to vague, ill-defined phenomena, about which we can assert little but their presence or absence. Accordingly Mill's remaining canons of induction deal with such phenomena. The method of agreement argues a causal relation between A and B when two trains of circumstances are known which begin in A, and have nothing else in common except their termination in B. The method of difference concludes that A causes B if a train of events is known which contains A and ends in B, while a train of events precisely similar except in that it does not contain A likewise fails to contain B. The joint method of agreement and difference is what its name would imply. The method of residues is that in which the unexplained parts of a nexus of events are linked up with one another. Not one of these methods is without grave dangers except in the hands of the scientist with a concrete knowledge of the field where he applies it. The artificial division or antecedent and consequent alike into a jig-saw puzzle of yes and no occurrences is vicious in the extreme.

Induction has been a method of human reasoning from time immemorial, and has especially characterized those centuries since Francis Bacon. Aristotle, who was the first to recognize induction as a scientific method, gave a very scant account of induction other than that by a complete enumeration of instances. Bacon followed him in this excessive restriction of inductive reasoning. The beginning of the 17th century marks a period when the progress of science had forced a consciousness of the inadequacy of the Aristotelian logic upon the world of learning. The accepted theory of deductive reasoning began to be supplemented in practice by a methodology, but no approximately adequate treatment of this methodology was developed until the middle of the 19th century. In 1840 Whewell (q.v.) published a work in which for the first time due credit was given to the function of imagining and speculation in inductive reasoning. Soon afterward Mill published his 'Logic,' in which he formulated the five methods of inductive research that have already been mentioned, and expressed the

theory, also mentioned above, that every induction in a syllogism with the uniformity of the nature as its major premise. Since the time of Mill the growth of inductive logic and methodology has been extremely rapid. (See LAW IN SCIENCE AND PHILOSOPHY; LOGIC; MILL, JOHN STUART). Consult Aristotle, 'Organon'; Bacon, F., 'Novum Organum'; Joseph, H. W. B., 'Introduction to Logic' (Oxford 1906); Mill, J. S., 'System of Logic' (London 1843); Russell, B. A. W., 'Our Knowledge of the External World' (Chicago 1914); Welton, 'Manual of Logic' (Pt. 11, London 1896); Whewell, W., 'Philosophy of the Inductive Sciences' (London 1840).

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INDUCTION, *in physical science,* the process by which a body having electrical or magnetic properties calls forth similar properties in a neighboring body without direct contact; in short, electrical influence. It is a familiar fact that an electrified or magnetized body causes electrical or magnetic disturbances in other bodies in its vicinity, when it is not in direct and visible connection with them, and this, in particular, illustrates the process known as induction. The word induction as employed by physicists occurs in combination with a number of other words, and involves, as well some other peculiar terminology, at which it may be not inadmissible to glance. Thus:

Statical or electrostatic induction is applied to the production of an electrical charge upon a body by the influence of another body which is charged with statical electricity. It can be shown by experiment that the inductive influence is transmitted through a non-conducting medium which may be considered as in a state of strain or tension. It is found, further, that the character of the medium determines the amount of induced electricity. The power of a non-conducting substance to transmit an influence of this kind, as compared with that of dry air, is known as its specific inductive capacity or dielectric capacity.

The principle of statical induction is involved in the electrophorus, in the Holtz and also in other influence or induction apparatus; and in the condenser, as in a Leyden jar, voltaic or electrodynamic induction, it is the production of an electric current, or rather an electric motive force, by the influence of an electric current. This latter is called self-induction when upon its own circuit; but mutual-induction, if it is the induction of a current upon another circuit. By current is here understood a definite quantity of electricity per second. When the current is induced by the action of a magnet, or when a magnetic condition is induced by an electric current, the result is alluded to as an example of electro-magnetic induction. Magnetic-induction is the production of magnetic properties in a magnetic substance, as in a soft-iron bar, by a near-by magnet, or by an electric current. Mutual induction is the reaction of two electric currents upon each other, a phenomenon due to the variations in distance between them. Peristaltic induction is applied by Thomson and others to mutual electrostatic induction between the wires of a multiple cable. Flow of induction across an element of surface in magnetism is the product of the surface of the element by the perpendicular component of induction.

Faraday disclosed the existence of the power and action of electric currents in neighboring conducting circuits to the world. His researches on induction, named by him "voltaic-electric induction," were published in the 'Philosophical Transactions' during 1831–32. Joseph Henry, in 1832, observed that when contact was broken in a long galvanic circuit, a bright spark occurred, which did not appear, when the circuit was short. This was shown by Faraday, in 1834, to be due to the extra current induced by the various parts of the circuit in each other. Bachhoffner, and also Sturgeon, in 1837, demonstrated that superior action, in induction apparatus, of a bundle of iron wires to that of a solid bar of iron. Henry, in 1841, studied the inductive action of induced currents of different orders. De la Rive designed, in 1843, an electro-chemical condenser, consisting of a primary coil, which, by means of an extra current, could enable a single galvanic cell to decompose water. The same decomposition, however, had been effected by White in 1840. Ruhmkorff constructed, in 1850 or 1851, the first so-named "induction-coil," the excellence of which was owing chiefly to the proper insulation of the secondary coil. Fizeau, in 1852, increased greatly the power of the coil by providing it with a condenser. This electrical instrument consists of two coils of wire wound one over the other upon a core consisting of bundles of iron wires. One of its circuits is called the primary circuit and the other the secondary circuit. These coils are employed for physiological purposes and also in connection with the telephone. But it is in connection with high-frequency electric currents for Röntgen ray work and wireless telegraphy that one finds the employment of the induction coil most often used at present. Of late years, coils of great power have been constructed, rivaling, if not exceeding, the most powerful electric machines in length and power of spark.

In considering induction, mention may be made to the interesting theory of Ampere. 'Ampere's theory' is applied to an electrodynamic theory proposed by Andre Marie Ampere. According to it, every molecule of a magnetic substance is supposed to be traversed by a closed electric current. Before magnetization the combined effect of these currents is zero. But by the magnetizing process they are supposed to be brought more or less fully into a parallel position. Then their resultant effect is said to be equivalent to a series of parallel currents traversing the exterior surface of the magnet in a plane perpendicular to its axis, and a certain definite direction, which, when the south pole is turned toward the observer, is that of the hands of a watch. These hypothetical currents are called Amperian currents. This theory is based upon the close analogy between a solenoid traversed by an electric current and a magnet. Ampere thus conceived that the magnetic action of the earth is the result of currents circulating within it, or at its surface, from east to west, in planes parallel to the magnetic equator.

The ultimate mechanism of induction is still somewhat obscure, but something has been learned of its general nature. In the early days of physical science it was believed that bodies

can act upon one another even across spaces that are absolutely void, and at the present time it is sometimes convenient to assume them to act in this manner, in forming mathematical equations for the treatment of physical problems. It is no longer believed, however, that this is what actually happens in nature; the phenomena of electric and magnetic induction being now attributed to motions or stresses in the ether which transmits light. (See ETHER). Newton was of the opinion that induction is an ether-phenomenon, and in the first half of the 19th century Faraday may be said to have established the ether hypothesis upon a substantial experimental foundation. In later years Maxwell developed Faraday's conceptions mathematically, and added much more evidence that was partly theoretical and partly experimental; so that at the present time there are few or no physicists who doubt that induction is a manifestation of some form of activity in the light-bearing ether. Opinion is still divided, however, as to the precise nature of this activity. In fact, we cannot hope to gain any very precise information on this point until much more is known about the constitution of the ether itself.

The charging of a condenser is a phenomenon in electrostatic induction. If the condenser consists of two parallel plates (for example), of a given size and set at a constant distance from each other, and we charge it to a given potential, the quantity of electricity that must be put into it in order to charge it in this manner depends to a considerable extent upon the nature of the dielectric (or insulating material) which separates the plates. If the charge that is required when air is the dielectric is taken as unity, then with plate glass as a dielectric the charge will have to be 8.45 (according to Hopkinson), in order to bring the potential of the condenser up to the same value as before. If the space between the plates is filled with common turpentine, a charge 2.23 times as great as that required with air as the dielectric must be communicated to the condenser. It is evident, from these facts, and from others of the same nature, that electric induction depends, to a large extent at any rate, upon the nature of the medium which separates an electrified body from the other bodies upon which the inductive influence is felt. The constants that are given above are known as the "specific inductive capacities" of the dielectrics to which they refer.

Electrodynamic induction is the basis of practically all of the electrical machinery that has been found serviceable to man. The fundamental fact of electrodynamic induction may be stated as follows: If a closed electrical circuit, such as might be formed by joining the two ends of a copper wire, is placed in a magnetic field, then no current will be produced so long as the circuit is everywhere stationary, and the strength of the magnetic field remains everywhere invariable. If the intensity of the magnetic field is increased, a current of electricity will flow around the circuit while the intensity of the magnetism is changing, the intensity of the current being proportional to the rapidity with which the intensity of the magnetism varies. As soon as the magnetism again becomes constant, the current in the circuit ceases. If the intensity of the magnetic field be diminished instead of increased, a current will also be produced in the closed circuit, but it will be opposite in direction to that produced by increasing the magnetic field. Currents produced in this manner are called "induced currents." Instead of varying the magnetic field while the circuit is fixed in position, we may move the circuit about in the magnetic field. If the magnetic field is everywhere uniform in all respects, and the circuit is moved so as to always remain parallel to itself, then no induced current will be produced; but if the circuit is moved from a region where the magnetism is strong to one where it is weak, or vice-versa, a current will be induced in the circuit, just as if the circuit were kept stationary and the intensity of the magnetism varied. Induced currents are also produced when, instead of being translated from one region to another, the circuit is rotated in a magnetic field, in such a way that the number of lines of magnetic force passing through it is either increased or diminished. In the induction coil the intensity of the magnetic field is varied, while the circuit in which the induced current is to be produced is kept stationary. In dynamos, on the other hand, the magnetic field is maintained sensibly constant, while the circuit in which the induced current is to be produced is rotated or otherwise moved about.

A current moving in a closed circuit produces a magnetic field in the space above it, and this magnetic field, when it varies on account of the variation of the current that produces it, causes the production of induced currents in any closed circuit that may happen to be near. Let us conceive two closed circuits, A and B, to be situated near each other, and let there be a current produced by any means in the circuit A. So long as the current in A is constant, no current will be produced in B; but if the current in A is variable, an induced current will be observed in B, whose intensity depends upon the rate at which the current in A is varying, upon the resistance of the circuit B and also upon a certain numerical factor, whose value depends upon the sizes and shapes of the two circuits, upon their positions with respect to each other, and upon the nature of the medium (air, oil and whatever it may be) in which they are placed.

If a pair of circuits, A and B, are near each other, and A is carrying a constant current of intensity C_1, while B is carrying a constant current of intensity C_2, then the displacement of either circuit, relatively to the other, would cause induced currents to flow in both; and hence (in general) neither circuit can be moved without the energy of the system being affected. The difference between the energy of a pair of coils that are near together, and the energy of a similar pair of coils that are conveying identically the same currents but are infinitely remote from each other, is equal to MC_1C_2, where M is a numerical factor whose value depends upon the sizes and shapes of the two circuits, upon their relative positions and upon the medium in which they are placed. The factor M is called the "coefficient of mutual induction" of the pair of circuits.

The various parts of a single circuit act upon one another inductively, just as separate circuits do; and a circuit that is wound upon a spool, or otherwise coiled so that its parts come near together, possesses greater energy than the same circuit would have, if it was not so coiled.

This fact is expressed by saying that every circuit has a certain amount of "self-induction." The energy that a circuit possesses in virtue of its self-induction is proportional to the square of the current that it is carrying, and to a certain numerical constant called the "coefficient of self-induction," whose value depends upon the size and shape of the circuit, and upon the medium in which it is placed. Like the coefficient of mutual induction of a pair of circuits, the coefficient of self-induction of a single circuit can be computed, for certain simple cases, by methods given by Maxwell, in his 'Treatise on Electricity and Magnetism'; but in the general case the computation is exceedingly difficult, and altogether impracticable; so that the values of these coefficients for given circuits are usually determined experimentally, except when a very rough estimate will serve.

The general subject of induction is essentially mathematical in its character, and cannot be properly explained nor understood without the use of the calculus. Consult Nipher, 'Electricity and Magnetism'; Maxwell, 'Treatise on Electricity and Magnetism.' See also the articles ELECTRICITY and MAGNETISM, in this encyclopædia.

INDUCTION, Mathematical. Despite the age-long tyranny exercised by the Aristotelian logic — a tyranny having, at least in the domain of science, scarcely a match except in the case of Euclid's elements — the forms of thought, those diagrammatic representations of the orderliness of the reasoning processes, sustain to-day perhaps even greater interest than ever before (see SYMBOLIC LOGIC). The mathematician's interest in these forms is twofold, attaching to them both as norms for testing the validity of arguments and as constituting exceedingly subtle matter for mathematical investigation.

Of all argument forms, there is one which, viewed as the figure of the way in which the mind gains certainty that a specified property belonging but not immediately by definition to each element of a denumerable (see ASSEMBLAGE THEORY) assemblage of elements does so belong, enjoys the distinction of being at once perhaps the most fascinating, and, in its mathematical bearings, doubtless the most important, single form in modern logic. This form is that variously known as reasoning by recurrence, induction by connection (De Morgan), mathematical induction, complete induction, and Fermatian induction — so called by C. S. Peirce, according to whom this mode of proof was first employed by Fermat. Whether or not such priority is thus properly ascribed, it is certain that the argument form in question is unknown to the Aristotelian system, for this system allows apodictic certainty in case of deduction only, while it is the distinguishing mark of mathematical induction that it yields such certainty by the reverse process, a movement from the particular to the general, from the *finite* to the *infinite*. See ASSEMBLAGES, THEORY OF.

Of the various designations of this mode of argument, "mathematical induction" is undoubtedly the most appropriate, for, though one may not be able to agree with Poincaré (see *Bibliography* below) that the mode in question is *characteristic* of mathematics, it is peculiar to that science, being indeed, as he has called it, "mathematical reasoning par excellence."

The nature of mathematical induction as it is ordinarily understood may be made clear by an example. Perhaps the simplest application of the method is found in the proof of the theorem:

$$(\alpha)\quad 1+2+3+\ldots\ldots+n=\tfrac{1}{2}n(n+1)$$

where n denotes any positive integer whatever. Suppose it ascertained by observation or otherwise that

$$(1)\quad 1+2=\tfrac{1}{2}2(2+1),$$
$$(2)\quad 1+2+3=\tfrac{1}{2}3(3+1).$$

Facts (1) and (2) justify the *suspicion* that (α) may be a fact. The proof by mathematical induction that (α) is indeed true runs as follows: It is *assumed* that (α) is true for some definite but unspecified integer n. Then by adding $n+1$ to each member of the assumed equation, n having the same meaning as in the assumption, one finds that

$$(\beta)\quad 1+2+3+\ldots\ldots+n+\overline{n+1}$$
$$=\tfrac{1}{2}(n+1)\,(n+2).$$

So it is seen that, if (α) *be* true for *some* integer n, it *is* true also for the *next* greater integer $n+1$. But by (2), (α) is true when n is 3; it is, therefore, true for $3+1$, or 4; therefore, for $4+1$, or 5. The argument is then usually closed by saying "and so on, hence (α) is true for any integer whatever," or by an equivalent speech. The reader will recall that the binomial theorem, the Newtonian expansion of $(a+b)n$, where n is any positive integer, is justified in essentially the foregoing manner. Numerous other examples of propositions similarly established may be found in the better recent textbooks of algebra.

The nature and the rôle of the foregoing *et cetera*, "and so on," demand consideration. Without it, the argument as stated seems obviously incomplete. But how is the *et cetera* to be logically justified? By reference to some axiom or principle of thought? If so, what? Or can the phrase be in some way dispensed with without damage to the argument?

Before attempting to answer them it may be well to show the inevitableness of the questions by a further analysis. Suppose it established, in regard to some property p (where, for example, p might signify the validity of the binomial theorem for some integral exponent): (1) that p belongs to the integer 1, that is, referring again to the mentioned example, the theorem is valid for the exponent 1; (2) that, *if* p belong to an integer n, it belongs to $n+1$. Propositions (1) and (2) furnish the means of generating, one after another, a sequence of syllogisms by which one proves first that p belongs to 2, then to 3, then to 4, and so on. Note that in order to ascertain by this analytic (syllogistic) method whether p belongs to a specified integer m, it is necessary to determine in advance the same question for each of the integers 2, 3, ..., $m-1$, in the order as written, a process requiring a number of syllogisms which is greater the greater the number m. Accordingly *this* method, of successive deductions, is not available for determining whether p belongs to each in the (infinite) *totality* of integers. Equally powerless to that end is experience (including observa-

tion), for this can take account of the individuals of a finite assemblage of objects at most. Either analysis or experience may avail if a sequence be finite, but if it be infinite both must fail. Not less vain is it to invoke finally the aid of induction as the term is understood and employed in the physical sciences, for this latter, resting upon a purely assumed order in the external universe, is confessedly *inductio imperfecta*, and, being such, can yield approximate certainty only.

Nevertheless, despite the inadequacy of the means mentioned, as soon as hypotheses (1) and (2) are admitted and the indicated sequence of deductions is *begun*, "the judgment imposes itself upon us with irresistible evidence" that p is a property of *all* the integers. Why? That is, how justify the "and so on"? It appears to be clear that the answer must be the adduction or invocation of an additional presupposition of formal thought, a presupposition whose formulation shall mark a conscious extension of the domain of logic by affirming as axiomatic that apodictic certainty can and does transcend every limited sequence of deductions or observations. Such presupposition, which may be called the axiom of infinity, is stated by Poincaré, in answer to the foregoing question, "why," as follows: "It is the affirmation of the power of the mind which knows it is capable of conceiving the indefinite repetition of a same act as soon as this act is found to be once possible." The act or operation, which cannot indeed be indefinitely repeated, but which by the axiom can be conceived as so repeated, is, in the present case, the construction of the syllogisms of the sequence above mentioned.

The *et cetera* in question is capable of justification without appealing, apparently at least, to the axiom of infinity, namely, by use of the so-called indirect method of proof, the method known as *reductio ad absurdum*. Thus let it be supposed that the argument sought to be indefinitely extended by means of the phrase "and so on" does not admit of indefinite extension along the ordered sequence of integers. There will, then, be a first integer, say $m+1$, for which the property p fails. As, by hypothesis, $m+1$ is the first integer for which p fails, p belongs to the preceding integer m; but since p belongs to m, it also belongs, by (2), to $m+1$. Hence the supposition that the argument does not admit of indefinite extension is false; and the conclusion is obvious. This procedure is convincing, but it is plainly less a natural completion than an "unindicated" fortification of the process it supplements. It is, besides, not entirely clear that the axiom of infinity is not surreptitiously subsumed by it.

By far the most penetrating investigation of the nature of mathematical induction was made originally by Richard Dedekind. (See *Bibliography* below). His procedure and result are, in brief, as follows: Let S denote a system of elements (things of any kind) such that there is a scheme of law ϕ of depiction by which S may be depicted upon itself, that is, a scheme by which each element e of S may be thought as corresponding to one and but one element e' of S and so that no two elements of S shall be thought as corresponding to a same element of S. The correspondent e' of e is called the picture or image of e. Every part of S (including S itself as a special case) thus depicted upon itself is named *chain under* ϕ. Denote by A an arbitrary part of S and by A_0 the assemblage of all the elements common to all the chains (in S) that contain A. It is obvious that, S and ϕ being given, there is one and but one A_0 for a given part A of S. A_0, which is easily seen to be itself a chain, is described as the *chain of A under ϕ*. Now let Σ denote an assemblage of elements. Dedekind proves the following

THEOREM.—*In order to prove that A_0 is part of Σ it is sufficient to prove:* (1) *that A is part of Σ; and* (2) *that, if an element A_0 belong to Σ, the image of that element belongs to Σ.*

Dedekind's proof, simplified, runs thus: Let $A_0 = A_1 + A_2$ where A_1 denotes the assemblage of all those elements of A_0 that belong to Σ. By (2), A_1 is a chain, and, by (1), contains A. Hence, by definition of A_0, A_2 has no element, whence $A_0 \equiv A_1$. Such is the beautiful and marvelously fundamental theorem which its author characterizes, perhaps a little extravagantly, as "the scientific basis" of mathematical induction. It is at any rate a basis, and by virtue of it, as shown below, proof by mathematical induction need have no recourse to an *et cetera* consisting of an endless sequence of syllogisms.

It will be instructive to apply Dedekind's theorem to the *completion* of the proof by mathematical induction of the binomial theorem.

$$(\alpha)\quad (a+b)^n = a^n + na^{n-1}b + \cdots\cdots$$

for positive integral exponents. Let it be granted that

$$(\beta)\quad (a+b)^1 = a+b,$$

and supposed it established in the usual way that (γ), if (α) be valid for some integer, as $n-1$, then it is so for the next, n. Denote by S the sequence of integers,

$$S \equiv 1, 2, 3, \ldots\ldots, n-1, n, \ldots\ldots,$$

by ϕ the scheme by which each number in S except 1 is the image of its predecessor, and let A be 1. Then A_0 is S identically. Let Σ denote the assemblage of positive integers for which (α) is valid. The reader will now observe that Dedekind's theorem enables one to prove by a *single* stroke, so to speak, that (α) is valid for all positive integers. For, by (β), (α) is valid for 1, that is, A is part of Σ and (1) is satisfied; and, as A_0, or 1_0, is S, it follows from ( ) that (2) is satisfied; γ hence S is part of Σ.

With the modern increasing interest in the philosophy of mathematics, mathematical induction has steadily gained in interest and acknowledged importance. Certain questions respecting its presuppositions and field await definite answers. It is agreed that every argument by mathematical induction is a mathematical argument, no matter what the subject-matter, but there is difference of opinion as to whether every mathematical argument is mathematical induction either in terms or in disguise. Were this converse true, mathematics (see MATHEMATICS) would be definable in terms of this mode of ratiocination. This and kindred questions are considered in the works cited below.

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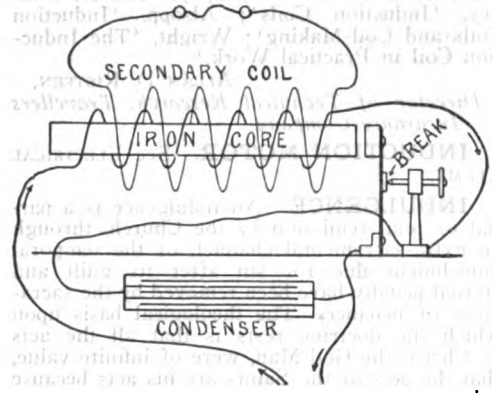
INDUCTION BALANCE, in physics, an apparatus designed for measuring and indicating the electrical conductivity of metals. It is based upon the principle of induction. The mere proximity of a metal, especially a metal that is a good conductor, will induce or draw magnetization as electrification from a charged wire, battery, etc. An induced current is always opposite in positivity to the near side of the charged source of current. In its most familiar form it consists essentially of four coils of fine wire, an electric battery, a circuit breaker and a telephone. Let the coils be designated, respectively, by the letters A, B, C and D; A being similar to B in all respects, and C being likewise similar to D. Coils A and B are placed in circuit with the battery, and coils C and D are placed in circuit with the telephone. The coils are disposed in pairs, A being placed near C, and B near D. If the current through A and B is rapidly interrupted, an induced current will, in general, flow through C and D, at each make and break; its presence being indicated by the sounds that it produces in the telephone that is in circuit with C and D. It is possible, however, to dispose the coils and their connections so that the current that A induces in C shall be sensibly equal and opposite to that which B induces in D. When the balance is perfect no sound will be heard in the telephone. If a piece of metal be now brought near the coil A, the intermittent current in A will induce currents in the mass of the piece of metal, and these, in turn, will act upon the coil C, producing induced currents in this coil which are not compensated by similar currents in D. The loss of balance will be at once indicated by the recurrence of sounds in the telephone; and in this way the metal fragment will betray its presence. The induction balance has been used successfully for locating bullets in the human body. The intensity of the sounds produced in the telephone depends not only upon the size and position of the disturbing piece of metal, but also upon its specific electrical resistance; and hence the balance may be used to compare the specific resistance of metals. When an induction balance is arranged for making measurements of electrical resistance it is usually termed an induction bridge.

INDUCTION COIL, one of the early electrical instruments, that simply illustrates the principle of induction, consisting of an iron core about which two wires are differently coiled: now used mainly for study, and in connection with high frequency currents, radiography and X-ray investigations. (See INDUCTION). The essential features of the instrument are represented, diagrammatically, in the accompanying cut. A soft iron core is surrounded by two coils of wire, the finer one outside of the other. The outer coil is the one in which the high tension induced currents are produced; it is called the "secondary coil," and is not in direct electrical connection with any other part of the instrument. The inner coil, which is called the primary coil, is of coarse wire, wound close to the iron core, and is connected to a battery, so that when the current from the battery is flowing the primary coil causes the iron core to become magnetised. As is explained in the article INDUCTION, no current is generated in the secondary coil, so long as the magnetism of the iron core remains constant; but whenever the magnetism of the core increases or diminishes, a current is produced in the secondary. A device called a "break" or "interrupter" is therefore provided, so that the magnetism of the iron core may be rapidly established and destroyed. The commonest form of interrupter is that indicated in the cut, which does not call for special explanation, since it is used in electric bells and other simple forms of electrical apparatus. The Wehnelt electrolytic interrupter is greatly in favor among physicists, however, and is now often used in connection with induction coils,



especially when they are to be run with the commercial current used for incandescent lighting, where the potential difference that is used is something over 100 volts. In the Wehnelt interrupter the primary coil on the iron core is made of a few turns of relatively thick copper wire, its purpose being solely to effect the magnetisation of the core; but the secondary coil, in which the induced currents are generated, is made of fine wire, and in order to multiply the inductive effect as far as possible, the secondary is made of great length, often containing many miles of wire. In the celebrated Spottiswoode coil the secondary contained no less than 280 miles of wire. The primary coil, being wound directly upon a soft iron core, commonly has a very considerable amount of self-induction, so that when the circuit is broken by the interrupter the current does not suddenly cease, but continues to flow across the interval at the break for an appreciable fraction of a second, as is readily seen by the strong sparking that occurs at the moment of interruption. In order to reduce the sparking as far as possible, a condenser of suitable capacity is provided, so that when the break is made in the circuit, the "after-current" due to the self-induction of the primary can

discharge into the condenser, instead of passing across the break in the circuit and causing a spark. The condenser causes the interruption of the current in the primary coil to be much more sudden, and it materially increases the potential that is developed in the secondary coil, since this is proportional to the rate of variation of the magnetism of the core, and is much greater when the magnetism falls off abruptly than when it persists for an appreciable fraction of a second after the break has been made.

The induction coil was brought into something like its present form by Ruhmkorff, and is frequently known, in consequence, by his name. Improvements in the winding of the secondary coil were introduced by Ritchie of Boston about 1857. Ritchie's most important improvement consisted in disposing the secondary wire in sections, which were so related to one another that the risk of internal disruptive discharge through the coil itself might be reduced to a minimum. Induction coils are very generally used in studying the discharge of electricity through gases, for exciting X-ray tubes and in connection with the high potentials required in wireless telegraphy. Consult Bonney, 'Induction Coils'; Alsopp, 'Induction Coils and Coil-Making'; Wright, 'The Induction Coil in Practical Work.'

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INDUCTION MOTOR. See ELECTRICAL TERMS.

INDULGENCE. An indulgence is a partial or total remission by the Church, through an extra-sacramental channel, of the temporal punishment due for sin after its guilt and eternal penalty have been removed by the sacrament of penance. The theological basis upon which the doctrine rests is that all the acts of Christ, the God-Man, were of infinite value, that the acts of the Saints are his acts because vivified by divine grace, and from this treasury of divine, supereminent merit the Church is able, so to speak, to pay the debt of temporal punishment for the repentant sinner.

Certain cardinal principles of Catholic life are requisite to obtain a correct idea of the Catholic doctrine of indulgences. Growth and adaptation have characterized the Christian organism from the Apostolic Council of Jerusalem to the Œcumenical Council of the Vatican. The development of doctrine, upon which such explicit emphasis was laid by the late Cardinal Newman, is of prime significance for the student who would institute a comparison between the teaching and practice of the Church in the matter of indulgences at the present day and during apostolic times. We may observe in passing that the principle of doctrinal development is in perfect harmony with the scientific spirit of the present age. Growth and adaptation are now believed to be distinguishing features of every living and progressive organism. We should not, therefore, expect to find the Catholic system of indulgences, in all its complex details, flourishing in the primitive Church. In harmony with the law of development, essential to every organization among men, we believe that the Church's "proud boast of *semper eadem*" is not defeated by calling attention to the richness, variety and flexibility of the outer forms of its polity and liturgy, or to the varying emphasis given to special dogmas in the course of its history, in response to the needs of particular eras. Unity in diversity is the Church's most appropriate motto. The doctrine and practice of indulgences, therefore, which obtain throughout the Catholic world at the present time must be sought for only in germ in Sacred Scripture and in the practice of the primitive Church, just as the bole, the branches and the foliage of an oak tree, "the monarch of the forest," existed potentially in the acorn from which it sprung.

Indulgences being the remission of the temporal punishment due to sin, the interpretation of the true character should start from the Christian idea of the nature and purpose of punishment. It is therefore strange that writers of all schools of opinion concerning indulgences should fail to correlate the two concepts. At the present day the conviction prevails almost universally among non-Catholic students of penology that punishment is exclusively disciplinary and correctional. No theory could be more alien to the spirit of the entire Old Testament or to the mind of the early Christian Fathers. The inflexible and rigorous justice of God making death the wages of sin appears in almost every page of the history of his covenant with Israel. The New Testament, founded on the atonement by Christ, only mitigates this view by impressing on the minds of men the possibility of vicarious satisfaction for their transgressions. But although Christ's atoning and vicarious sacrifice was all-sufficient in itself, or objectively considered, to satisfy the offended justice of his Heavenly Father, nevertheless the Christian economy of redemption demands each individual's co-operation at every stage in order to appropriate Christ's merits and make them subjective to himself. The opposite view (that is, the belief), that the creature has no active part in his sanctification and salvation, inclines toward Pantheism, robs good works and the Christian sacraments of genuine value, and differentiates the Lutheran from the Catholic position. According to Catholic teaching the guilt of sin is cleansed from the soul by the application of the merits of the precious blood of Christ through the instrumentality of the Sacraments, whose efficacy, in the case of adults, depends on the subjective disposition of the recipient. The eternal punishment due to sin disappears with the guilt to which it is annexed. But, besides having these supernatural and eternal relations and consequences, sin viewed even within the circumscribed limits of man's natural life on earth is an act of treason against God in His own kingdom involving forfeiture of all rights to life and all the good things with which God's providence has so bountifully enriched it. This temporal consequence of sin calls for a temporal reparation. The canonical penalties therefore imposed on the Church during the first centuries were intended to pay this temporal debt to the Divine justice, and were not merely disciplinary or correctional; and the sinner, in submitting to them, or in seeking mitigation

from them through the intercession of the martyrs, recognized the necessity of his own personal act to satisfy the justice of God, either directly or vicariously by appropriating through the charity of the Church the superabundant merits of Christ and His Saints.

An indulgence granted to the living is an act of jurisdiction, or exercise by the Church of the power of the keys conferred on it in the well-known words of the Gospel of Saint Matthew: "And I will give to thee the keys of the Kingdom of Heaven, and whatever thou shalt bind on earth, it shall be bound in Heaven, and whatever thou shalt loose on earth, it shall be loosed in Heaven." Every Church, in so far as it is a visible organization, claims in some degree a power of the keys, that is, the right to admit or exclude members — to determine fellowship. But the antithesis so emphatically expressed in the text between heaven and earth proves that the kingdom of heaven there spoken of is more comprehensive than the visible Church of Christ. It is proclaimed that the power of binding and loosing on earth bestowed upon the Apostles and their successors, is ratified in its every act by the supreme tribunal of God in the Church triumphant. In accordance with a well-known principle of Catholic exegesis, the best interpretation of a text of Sacred Scripture is furnished by the universal tradition of the Church from the age of the Apostles to the present time.

Saint Paul, in his epistles to the Corinthians, describes how he imposed punishment on the incestuous Corinthian and how he subsequently remitted it. The penalty was not merely an ecclesiastical censure of excommunication inflicted primarily for the purpose of safeguarding the flock of Christ. The Apostle expressly states that the chief motive which actuated him was anxiety for the individual salvation of the transgressor. Nor could it have been (as has been already shown) a mere disciplinary measure to impress upon the sinner the gravity of his crime or to test the sincerity of his repentance. Having no organic relation to confession, whether public or private, and no expressed or implied connection with perfect contrition, it was not a part of any conceivable Christian ordinance for the remission of the guilt and eternal punishment of sin. According to Catholic reasoning, it was therefore an exercise of the power of the keys by the Apostle to remit a temporal debt due to God for the offense; and since, according to universal Jewish and Christian belief, the Divine Justice rigorously demanded either direct or vicarious satisfaction, the Apostle could only concede that "indulgence" by appropriating to the individual sinner the superabundant merits of Christ and the Saints out of the treasury of the Church.

It will be observed that the Apostle of the Gentiles granted the first recorded indulgence in the form of an absolution. Indulgences usually took this form in the primitive Church. The early Fathers frequently refer to their being thus conceded by bishops on the presentation of a "Libellus Supplex" given to the penitent by some Christian martyr on the eve of suffering an heroic death for Christ. It is interesting to note that the present practice of never granting those favors except to persons who are in full communion with the Church, and who have received the Sacrament of Penance, was substantially insisted upon by Saint Cyprian. He demands that the martyrs should not grant "Libelli" except to persons who had abandoned their sinful career and given ample evidence of heartfelt contrition and sincere conversion. Indulgences in the first centuries of the Church having implied a diminution of the period of canonical punishment — the name by which this act of leniency was then known was *φιλανθρωπία* — (Consult Concilium Ancyra, can. 5; cf. Hefele, 'Conciliengeschichte'), such expressions as an indulgence of seven years and seven quarantines came into use. An indulgence of seven years means the condonation of as much of the temporal debt due to God for sin as canonical punishment extending over seven years would atone for. Likewise an indulgence of seven quarantines connotes a canonical punishment extending over seven Lents.

We find in the writings of Saint Augustine reference to the remission, in return for almsgiving, of temporal penalties imposed for minor ecclesiastical offenses. Thus there gradually grew up the custom of granting indulgences under the form of commutation. Under this form they were especially conspicuous during the period of the Crusades. Every person who confessed his sins in a sincere and contrite spirit, received Holy Communion and joined the Crusade for liberating the holy places from the infidels was declared to need no other penance. "*Iter illud pro omni Pœnitentia reputetur*" was one of the decrees of the Council of Clermont, held under Urban II in the year 1095. The system of commutation for almsgiving afforded opportunity for abuse, as was evident in the practice of "farming out" to laymen the collection of alms in return for indulgence. Thus, for example, in the case of the famous indulgence granted by Leo X, in 1517, to the Catholic faithful on condition that they would contribute to the completion of Saint Peter's basilica in Rome, the right of collecting the money was conferred, in the first instance, on Albert, bishop of Maintz, and then sold by him to an Augsburg banker. Circumstances like these gave occasion to the Protestant party to charge the Church with the "sale of indulgences." Cardinal Pallavicini, the celebrated Jesuit historian of the Council of Trent, does not hesitate to say that if Leo X had been surrounded by able theologians and enlightened by their counsels he would have proceeded more cautiously in dispensing indulgences. However, it should in justice be recognized that the erection of Saint Peter's in Rome, the ancient capital of the Christian world, was an enterprise of the deepest interest to every member of the faithful. Together with the incidental abuses connected with commutations, other circumstances combined to inspire disaffection for the Holy See in the minds of European rulers and their dependents; and, as in the case of every revolution fed by prolonged and deeply-rooted discontent in the minds of those who control public opinion, a spark sufficed to start the conflagration. The life of Luther recently published by the Rev. Heinrich Denifle, O.P., and the abundant controversial literature which it has called forth from the ablest Protestant historians and the-

ologians of Germany, have proved that the first Apostle of the Protestant Reformation was an epoch-maker by reason of conditions, not because he possessed in any high degree the qualities of the *Uebermensch*. Yet the nailing of his 95 thesis on the doors of the castle church of Wittenburg in protest against the indulgence granted by Leo X, and preached by Tetzel, subdelegate of Albert, bishop of Maintz, set all Europe aflame and destroyed the dogmatic unity of Catholic christendom.

Opposition to the doctrine of indulgences arose at different times, not because of their alleged novelty or repugnance to the religious sense of the Christian people, but because they did not always approve of the object for which alms were obtained by the preaching of indulgences, or because of the personal defects of those entrusted with their promulgation. It should be distinctly noted that these purposes were not always strictly religious. They were frequently philanthropic, such as the construction of bridges, the erection of hospitals, etc., and in such cases received the unqualified approval of princes and people. In order to comprehend the outburst which Luther was able to evoke against the indulgence granted by Leo X we must bear in mind, besides the questionable motives that are alleged to have partly inspired the action of that pontiff, also the bitter memories that tarried in the minds of European monarchs after their defeat on the question of investitures, and the death-blow dealt thereby to the feudal system. The entire antipathy aroused, for this and other reasons, against the Holy See in the time of Leo X found vent in the attack initiated by Luther on indulgences.

An indulgence may be acquired directly by the living and applied by them, with the consent of the Church, to the souls of the faithful departed. All Catholic theologians are unanimous in the opinion that an indulgence should not be granted without grave and substantial reasons, since the ordinary Christian economy demands that each individual should make personal reparation for the temporal debt due for his sins. Moreover, in order to participate fruitfully in an indulgence, certain conditions and dispositions are necessary on the part of the subject. He must be in the state of grace, have a genuine desire to gain the indulgence, and perform certain acts prescribed by the Holy See.

The application of indulgences to the dead is not a judicial act of the Church, whose jurisdiction is limited to the members of the militant or visible Church on earth. Remission of the temporal debt due to God for sin by the suffering members of Christ's mystical body in Purgatory is communicated to them by the Church by way of suffrage or supplication. In other words, she authorizes the living to join their petitions with hers that God may graciously accept the indulgences which they gain and in the measure in which they gain them, in behalf of the souls of the faithful departed. Indulgences are now dispensed partly by way of absolution and partly by way of commutation. The well-known distinction between partial and plenary indulgences should be understood in an objective sense. The degree in which any indulgence is actually gained or subjectively appropriated by the individual depends on his subjective disposition, according to the theological maxim: whatever is received is received according to the measure of the recipient. The most solemn of all plenary indulgences is that which is granted on the occasion of a jubilee such as that which was proclaimed for 1904 by His Holiness Pius X to mark the 50th anniversary of the definition of the Immaculate Conception by Pius IX.

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INDULGENCE, Declaration of. See DECLARATION OF INDULGENCES.

INDULINES, dyestuffs, blue, bluish-red to black in shade. They were discovered in 1863 by J. Dale and H. Caro, and carry an English patent (No. 3307). They are formed by the interaction of para-amino azo compounds with primary monamines in the presence of a small quantity of mineral acid.

INDULT, a papal license, as when the Pope authorizes the bishop to grant certain relaxations during the Lenten fast required by physical necessity.

INDUNA, a word (Zulu-Bantu) signifying officer.

INDUS (Sanskrit, *Sindhu*), the chief stream of the northwest of India, and one of the great rivers of the world. It has a length of about 1,900 miles, and drains an area of more than 360,000 square miles. It arises in Tibet on the north of the Himalaya Mountains, nearly 100 miles northwest from the sources of the upper Brahmaputra (q.v.), on the north side of the mountain mass of Kailâs, 18,000 feet above sea-level. In the upper part of its course it takes a northwesterly direction along the northern foot of the main Himalayan range, enters the Kashmir territories, passes through Ladak, below the capital of which, Leh, it receives the Zanskar, farther on the Dras, after which it enters Baltistan. Here it receives, on the right, the Gilgit, from a glacier of the Karakoram, the largest tributary that joins it in the Himalayan regions, and takes the name of Indus or Sind. About 100 miles below this it takes a sudden bend toward the southwest, and after a course of about 180 miles more in this direction it leaves the loftier regions. At the British fortress of Attock in the Punjab — where it is crossed by a great railway bridge carrying the line to Peshawar — it is joined by the Kabul from Afghanistan, and here, 950 feet above the level of the sea, it is nearly 800 feet wide and from 30 to 60 feet deep according to the season. For the rest of its course (about 900 miles) it continues its southwesterly direction till it enters the Indian Ocean. At Kalabagh, 110 miles below Attock, it has a breadth of over 1,400 feet. Arriving in the low-lying country, its waters become charged with mud, and in the rainy season, and by the melting of the snow in the mountains, it overflows its banks. Near Mithankot it receives on the east the Panjnad, or united stream of the Five Rivers of the Punjab. Below the confluence it has a width of over 1,900 yards when the water is low. In Sind it gives off several extensive arms or canals, which are of great value for irrigation; and

below Hyderabad it divides into a number of shifting mouths or estuaries, the most navigable of which is at present the Yatho mouth. The delta, formed by the enormous amount of alluvium brought down by the river, has a coast-line of about 130 miles, and the point or head of it at Tatta is 70 miles from the sea. The tide rises to this distance. The Indus loses much water from passing through dry and desert regions, and much is also drawn off for irrigation; accordingly it brings down much less water to the sea than the Ganges. Vessels drawing more than seven feet of water cannot generally enter any of its mouths; but steamers of light draft ascend from Hyderabad to Multan. A railway ascends the valley of the Indus from the important port of Karachi to Peshawar.

INDUSTRIAL ACCIDENTS. See ACCIDENTS; MINE ACCIDENTS.

INDUSTRIAL ARBITRATION. See ARBITRATION, INDUSTRIAL.

INDUSTRIAL COMBINATIONS. See COMBINATIONS, INDUSTRIAL.

INDUSTRIAL AND COMMERCIAL LIBRARIES. See LIBRARIES, INDUSTRIAL AND COMMERCIAL.

INDUSTRIAL CORPORATIONS. See CORPORATIONS.

INDUSTRIAL CRISES. See CRISES, ECONOMIC.

INDUSTRIAL DEMOCRACY. See DEMOCRACY.

INDUSTRIAL DISTRIBUTION. The title Industrial Distribution, as here used, refers to the agencies and policies used by manufacturers in the marketing of their goods. If a comprehensive discussion of modern marketing methods were contemplated it would be in order to define the functions of the various institutions which serve in common all branches of commercial activity and then to set forth the practices used for the distribution of agricultural products, the methods used by manufacturers, and the organization and management of wholesale and retail trade. This all refers to the merchandising of movable commodities and takes no account of the interesting methods which have been devised for the sale of other goods, such as real estate, transportation, securities, professional services, entertainment, etc.

The Institutes of Trade.— In considering the manufacturer's problem specifically, it is worth while to begin with mention of the underlying institutes of trade. The first of these is the accepted system of weights and measures. Based in part upon legal enactment, and in part upon custom, the commercial measure is the unit to which price is usually attached. If it be in any degree vague, representative trading is discouraged and the cumbersome methods of lot inspection and of dickering and bargaining prevail. Modern trade is carried on with a system of weights and measures which is in part antiquated and in whole heterogeneous. The defects of the system have long stimulated reformers to work for a comprehensive and logical plan, such as the metric system appears to present. The trading community, however, is wedded to custom and is mindful of the inconvenience of the transitional period, of the capital invested in scales, containers, etc., and of the obsolescence which would overtake existing records if a change were made.

The System of Grades.— The second institute of trade is the system of grades, by which differences in quality are made definite and expressed. Without the foundation of legal enactment, which stabilizes our weights and measures, and with only so much public control as will prevent the grosser forms of fraud, the system of grades used in commerce is elastic. Old grades are continually being dropped and the names and definitions forgotten, while new grades with appropriate words or phases to designate them are introduced as advances in the manufacturing art require. The terminology of commercial grading is enormous: a book of large size is required to define the better-known kinds of textile fabrics. The legitimate terminology of grading is further overlaid by a vast variety of expressions used by traders either as a part of the game of trade puffery or as an endeavor to coin a trade name and get it introduced into the language as an indispensable trade term. Practically all of our systems of grades took their general form in an earlier day when few qualities were offered, and those were decidedly distinct from each other in physical properties. The need for a finer gradation of the quality scale has given rise to split grades or intermediate grades. In addition to these legitimate grades, the market has to cope with the skin grades of dishonest traders. Skin grades are qualities pitched so slightly below the recognized standard grades that while they may pass for what they are among traders and at an appropriate abatement of the standard-grade price they are expected to deceive consumers and sell at full prices to the general public.

Prices.— The third institute of commerce, and the most important, is price. A price is the exchange value of a commodity expressed in terms of money. The common expression is that price marks the equilibrium of demand and supply. The factors which determine price are not simply the primary supply of producers and the ultimate demand of consumers, but all those speculative activities of traders who, in anticipation of the future increase or decrease of supply or demand, alternately hold back goods from the market or throw reserves upon it. Since the manufacturing industry is reasonably stable in its productive capacity and the retail and wholesale industry likewise in its distributive capacity, and since the habits of consumers tend to remain reasonably constant over short periods of time, if left undisturbed by outside conditions, we must look elsewhere for the factors of change which are responsible for price fluctuations. Two of the chief causes of these fluctuations are changes in the weather, which influence the production of raw materials, and derangements in the credit mechanism of industry. These factors of change the manufacturer should learn to watch as barometers predicting future market movements.

The Market.— The fourth and final institute of commerce, to be here mentioned, is the

market. A market is an assembly of traders actively engaged in trade, and so limited by location, by the class of articles dealt in and by the average size of sales that the action of any one trader promptly influences the action of others. From this interdependency of action there results the chief circumstance which characterizes a market, namely, that upon it a commodity has but one price at a given time. Discrepancies of price will of course result from imperfect competition, but a process of mutual value adjustment is the essence of market action. What is an efficient market? To answer this question it is necessary to recall that among the essential conditions for the efficient purchasing and selling of commodities there are required assortments to select from, protection for perishable articles, reliable measures of quantity and quality, transportation facilities, fair prices and flexible credit facilities. Assortments are judged by purchasers with reference to the market as a whole rather than as to the stock of any one firm. A city has the proper stocks only when its merchants go beyond the usual process of stocking what is called for, and make systematic study of the resources and requirements of the adjacent trade territory. Measurement of quality and quantity requires a variety of agencies, such as the grading rules and inspection service of produce exchanges. Efficient transportation is secured only in cities which plan comprehensive terminal facilities. Storage calls for special types of warehouses tied into the transportation system rather than, as is usually the case, operated as an annex to the buying and selling process. The formula for fair prices is to bring to bear upon each purchase and sale transaction all possible elements of supply and demand which are logically related to it. This means to bring the past and future supply of an article to bear upon the present price by warehousing. It calls for bringing diverse commodities to bear upon each other in so far as they are related, either in the productive sequence as raw materials and manufactured derivatives or as substitutes. The sequence can be drawn upon in the forward direction only where the converting (manufacturing) interests are active. The formula requires further that the price of the use of money for a period of time (which is interest) be brought to bear upon the probable fluctuations of the price of goods during that period. As the price of money for brief periods is chiefly the cost of appraising the security offered, those markets have the steadiest commodity prices where loanable capital is plentiful and where there exist the grading, measuring, storing, insuring, credit reporting and other facilities which make it safe to loan on stocks of merchandise. Finally, the prices of different markets should be brought to bear upon each other by an adequate system of reporting. From all of this it is evident that a market is a complex thing. A good market is rare. It does not just grow, as Topsy did. It is the result of intelligent joint effort on the part of its members.

The Manufacturer's Price Problems.— The manufacturer has his own characteristic relation to all of the institutes of commerce. It may perhaps be said that his chief commercial problems revolve around the subject of price. There are three of these problems which merit brief presentation. They are, first, the question of varying the price with the quantity sold; second, the effort to protect dealers' profits by charging different prices to different classes of buyers; third, the project of further protecting such profits by controlling the prices of resale or the prices charged by dealers when they sell to consumers.

Quantity Prices.— It has long been a custom of trade to give to trade buyers who purchase large quantities (case lots, car lots or entire output) a lower price than is accorded to the small buyer. This is justified as a rebate to the large buyer of a portion of the saving in agency expense, bookkeeping, collection expense, etc., which his large order involves for the manufacturer. Upon this saving rests one of the well-known types of economy of production on a large scale. To take advantage of it, a variety of trading organizations has been developed in the United States in recent decades. In the wholesale trade the great interstate jobbers have grown up to hunt for the larger orders, leaving intensive work with the small retailers to the local wholesalers. To equalize the competitive advantage the small wholesalers have, many of them, combined more or less loosely into buying groups pooling their orders in the hands of syndicate buyers. The syndicate buyer maintains buying offices in the larger markets. He either pools the orders sent to him by his patrons into large consolidated orders, or he peddles out large purchases which the financial embarrassments of manufacturers enable him to make at bargain prices. In the retail trade quantity prices have led to the growth of department stores which aim at local mass retail distribution. They have led, also, to the growth of mail order houses, which aim at national mass retail distribution. Finally they have led to the organization of chain store systems which aim to combine mass buying and local small-scale retail distribution. The retail institutions just mentioned not only work for quantity prices but to a considerable extent eliminate the jobber.

The result of the appearance of these quantity-buying, direct-purchasing institutions is that the regular trade — sometimes called "legitimate" — comprising the local wholesalers and the single-line and country-store retailers — has been awakened to hostility. This hostility has taken the form of expressions of opinion on the part of associations of wholesalers and retailers, and of more or less exclusive trading arrangements of the small retailers with those wholesale houses who do not sell to mail order houses and chain stores. It has also taken the form of discrimination against such manufacturer's goods as appear on the shelves of such stores. Inasmuch as the regular trade comprises the overwhelming majority of the merchandising business of the country, these hostile moves have been given respectful attention by the manufacturers. The answering policy of many manufacturers has been to charge one price to all trade buyers, regardless of the quantity purchased. This puts the small store upon an equality, in the first cost of merchandise, with its department

store neighbor. Some manufacturers have adopted very elaborate policies for the protection of the small dealer, and have stimulated the antagonism of the small dealer against the large one, in order to pose as a friend and get the business.

It can be seen that excessive reductions of price for quantity tend to concentrate the buying function, as contrasted with the selling end of merchandising. By it buyer and salesman are forced apart. So the local store unit of the retail trade loses flexibility in assembling such stocks as the locality requires. Its stock, as illustrated by the chain-store stock, becomes standardized and a matter of safe staples chiefly. Quantity price operates to the disadvantage of the village and the sub-centres in the outskirts of cities. It is to the advantage of the large stores in down-town metropolitan districts. On the other hand the opposite policy of one price, regardless of quantity, prevents the large city from enjoying the advantage its mass of business entitles it to, and prevents the capable dealer who has built up a large business on merit from enjoying a portion of the advantage his large purchases give to those who supply him. It tends, therefore, to keep alive a large number of small, incompetent establishments based upon the principle of proximity to the consumer.

Classification of Customers.—The second price problem of the manufacturer, to which we have referred, has to do with the necessity of maintaining dealers' profits. Goods flow up hill in price, as water flows down hill. The difference between the price paid by a wholesaler and that paid by his customer who is a retailer is a spread, out of which must come the wholesaler's costs and profits. If a manufacturer sell to a retailer on the same terms as to the wholesaler who has been supplying him, it is obvious that the wholesaler cannot continue to patronize that manufacturer. If in a typical distributive chain we have manufacturer, commission merchant, wholesaler and retailer, there will normally be four price levels, each higher than the other, and each maintained at a certain spread with reference to the others by the normal operation of competition. Into this normal situation a disturbing influence has been introduced by the abnormal growth of certain retail and wholesale institutions, in response to the economy of quantity prices, and in response to superior managerial talent. These large institutions have very naturally tried to change their class as buyers and purchase on the same terms as institutions prior to them in the distributive chain. So we see everywhere retailers who advertise themselves "wholesalers and retailers," to facilitate an approach to manufacturers. It has been found difficult to frame a satisfactory definition of what a wholesaler is. Inasmuch as manufacturers are commonly admitted to buying privileges with other manufacturers and with wholesalers, all small shops and local repair men are anxious to be classed as manufacturers and to buy either from manufacturers' catalogues, or at least from the same traveling salesmen as serve the neighboring retailers. Hotels, likewise, are privileged buyers: therefore restaurants and boarding-houses put themselves forward as much as possible for the same privileges. Dealers and agents are usually advanced one class in the distributive chain: therefore an innumerable number of persons acquire agencies for the sale of wagons, automobiles, windmills and manufactured specialties, for the purpose of purchasing their private supplies at better advantage. Against this tendency to break down the classifications of trade merchants have been obliged to interpose an influence. This they have done by drawing up lists of classified buyers. Such lists are usually formed by the joint action of two trade associations and are promulgated to govern the conduct of the members with reference to the trade classes covered by the definitions.

Control of the Prices of Resale.—A third price problem has been forced upon manufacturers as a result of the intensity of competition between retailers. One of the modern tricks of retail selling is to offer one article or a few articles at a very low price, and feature the prices of these by advertising as "leaders." The psychology of the leader is that the customer will infer from the few low prices quoted that all prices in the store are equally moderate. In practice, the leader is supposed to bring the customer into the store where his cravings will be so intensified by the sight of merchandise that he not only purchases the leader, after which he came, but purchases a variety of other articles as well. These latter carry a good profit and recoup the loss on the leader, so that the result of the total transaction is a profit for the store. The best articles to choose as leaders are those branded or trade-marked articles which are known to be identical in whatever store they may be found. These will bring out in full force the price comparison, free from any possible argument that the quality may be better where the price is higher. When, therefore, a manufacturer builds up a reputation for uniform quality, and his goods become well known, his merchandise best serves the dealer as a leader. It might be concluded that if the dealer lowered the price he would simply sell more goods and so would confer a favor upon the manufacturer. The history of a leader is, however, that after it has served a temporary purpose of attracting attention, it is dropped. As it is impossible to at once restore normal prices for the article, the dealers who once featured it exclude it from stock, or if it have too well an established position with the consumer for this, relegate it to the background so that the losses on it will be as small as possible and push other things in preference to it. Distribution falls off, therefore, and the manufacturer is aroused to action. The action which manufacturers have taken has been along the line of endeavoring to dictate to wholesalers and retailers at what price they may sell, and to whom they may sell, and then to enforce these dictates by cutting off the supply of goods from those dealers who disobey orders. These efforts have brought manufacturers within the pale of the Federal laws which forbid contracts in restraint of trade. A considerable variety of devices has been invented by manufacturers in the endeavor to encumber the title to a movable chattel with restrictions, in connection with its sale, and without creating a bona-fide relation of principal and agent. These devices have been uniformly declared

null and void by the United States Supreme Court.

Miscellaneous Elements of Manufacturer's Distributive Campaigns.— Of the many minor distributive problems of the manufacturer, embracing such matters as the design and use of trade-marks, trade-names and brands, and the significance of packages as brand carriers and as a means of specializing an article out of its competitive class, there is not room to speak. Likewise the purport of style as a trade device for rendering goods in consumer's hands obsolete; of agency systems, such as prevail in the automobile and agricultural implement businesses; of list-price systems, used in the construction of catalogues; and of the trials encountered in administering discounts for cash and of preventing the cancellation of contracts can only be alluded to. In other articles the functions of advertising and of salesmanship as general aids to distribution are given appropriate attention.

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INDUSTRIAL EDUCATION. See EDUCATION, INDUSTRIAL.

INDUSTRIAL EXPOSITIONS. See EXPOSITIONS, INDUSTRIAL.

INDUSTRIAL FATIGUE. No phase of industrial efficiency is attracting greater attention, both in this country and in Europe, than the question of fatigue. While comparatively little thought was given to this matter prior to the war, except by a few progressive manufacturers and exponents of scientific management, the necessity of meeting war-time emergencies led to a careful investigation of the subject of fatigue with a view to increasing the industrial output to the highest degree possible without making too great demands upon the health and strength of the workers.

A study of industrial fatigue was one of the purposes for which the British Health of Munition Workers Committee was appointed, in September 1915, and the 'Memorandum' published by the special committee entrusted with the investigation of this subject emphasized the importance of the effect of injudicious effort upon the character of the work performed. Among the conclusions of the committee were:

"The committee are bound to record their impression that the munition workers in general have been allowed to reach a state of reduced efficiency and lowered health, which might have been avoided without reduction of output by attention to the details of daily and weekly rests. The signs of fatigue are even more noticeable in the case of managers and foremen, and their practical results are probably more serious than in the case of the workmen.

"It is of great importance to note that a special and strenuous voluntary effort in industry, if it be maintained under a badly arranged time-table of work and rest, does not necessarily bring increased output over a long period, however praiseworthy the intention or effort may be. Under wrong conditions of work, with excessive overtime, it is to be expected, indeed, that some deliberate 'slacking' of the workers might actually give an improvement of output over a period of some length by sparing wasteful fatigue, just as the 'nursing' of a boat crew over a part of a long course may improve their performance. It can not under such circumstances be said that a workman so restraining himself, consciously or unconsciously, is doing more to damage the output, on the whole, than the employer who has arranged overlong hours of labor on the baseless assumption that long hours mean high output."

In the United States, the Council of National Defense recognized the importance of this subject soon after preparations for war began and started investigations in factories engaged in the manufacture of war supplies to determine how a maximum output might be obtained without unnecessary fatigue. The results of this series of studies and experiments was published in January 1918 by the sub-Committee on Industrial Fatigue. Like the British report, it draws the conclusions that while "it is often possible to increase output temporarily by increasing the work of the employee . . . such a method, if carried far, quickly defeats itself and in the long run is not profitable," as "fatigue is the greatest single obstacle to a maximum output."

The committee naturally lay emphasis upon the distinction between the harmless fatigue that is the normal effect of bodily activity and the unnatural fatigue that is the result of badly arranged hours of labor and other improper industrial habits, and it recommended various methods for the reduction of the latter, not only without decreasing the output but "even in some cases with an increase of it." These methods include:

1. Adjusting Hours of Labor.— While it is obvious that the length of working day that avoids fatigue varies with different kinds of work and can be determined only by careful study, the tendency to increase hours and introduce overtime work has not always proved profitable. "A man can do more work in two hours than in one hour," say the committee, but "it does not necessarily follow that he can do more in twelve hours than in ten, or more in ten hours than in eight. In fact, whenever the work is of such duration that fatigue begins to be pronounced, it has been shown again and again that shortening the working-period actually increases the amount of work done."

2. Discouraging Overtime.— The committee's investigations seem to justify the discouragement of overtime on the ground that, if the ordinary day's work has been properly adjusted, it will stop just short of undue fatigue and the overwork necessitated by overtime will produce injurious results by diminishing the worker's efficiency, in lessening the output and increasing the amount of spoiled work.

3. Eliminating Sunday Work.— In advocating the elimination of Sunday work as a dangerous expedient, the committee's findings agree with the report of the British Health of Munition Workers Committee, who found that "seven days' labor only produces six days' output," and, they added, "the evidence before the committee has led them strongly to hold that if the maximum output is to be secured and maintained for any length of time, a weekly period of rest must be allowed."

4. Bad Effects of Night Work.— While the committee recognized the necessity of operating

many factories on day and night shifts to increase the output of war supplies, they felt that in the long run night work will prove detrimental to the health of the workers, and they recommended a consideration of the plan to alternate day and night work, changing the shifts at intervals, say every other week. The report called attention to the fact that the British committee made a careful statistical study of the output under both systems and found that "where the same night-shift continues to be employed the total output is less than where there is an alternation of day- and night-work."

5. Rest Periods.— The introduction of rest- or recess-periods during the ordinary working hours has also been found effective in reducing fatigue and improving the quality of the output. In many plants all workers engaged intensively during the entire work-period are compelled to take two recesses, one in the morning and one in the afternoon. Such rest-periods are not optional but compulsory. The workers are forced to leave their machines and to move about and relax. In some cases a little food or a cup of tea or cocoa is provided.

6. Providing Seats.—The committee advised that, wherever possible, seats be provided in order that operatives may not have to stand all day; and suggested that, instead of being of uniform height, the "seats should be adjusted to the individual worker," and, "where the worker's feet cannot reach the floor, foot-rests should be provided."

7. Value of Motion Studies.— The committee also recognized the value of motion studies and the importance of the element of variety in the work performed, a conclusion that is in harmony with the theories of scientific management. In 1916, Richard A. Feiss, general manager of the Clothcraft Shops, Cleveland, Ohio, speaking before the American Public Health Association, declared that "speed in itself is not injurious. . . . There are conditions under which operating at half the best possible speed is more fatiguing and more injurious to the worker's health than operating at the best possible speed under proper conditions." This idea is also maintained by the committee, who advise that proper studies of motions be made with a view to the elimination of all awkward, unrhythmical and unnecessary motions, that the work may "be done with the least possible waste of energy and time." It also advocates the introduction of a little variety into work that must become monotonous through being the constant and rapid repetition of the same movement, and suggests that alternating processes might diminish the fatigue without diminishing the output.

8. Sanitation and Ventilation.— The committee found that fatigue diminishes and efficiency increases in keeping with the improvement of the sanitary conditions of the factory and the ventilation of the workroom. Excessive heat and humidity should be avoided as far as possible and the air should be kept in motion. Lighting facilities, the supply of drinking water, providing lunch-rooms and rest-rooms and the general sanitary condition of the toilets and wash-rooms, all play a part in the general plan for the elimination of fatigue.

See INDUSTRIAL HYGIENE; INDUSTRIES, WELFARE WORK IN.

JOHN R. MEADER.

INDUSTRIAL FRUITS, those products of the soil which are sown and planted and upon reaching maturity are garnered or harvested, such as grain, vegetables and other crops. They are distinct from the natural fruits, such as trees, grass, etc., and are considered as personal and not real property.

See GROWING CROPS, LAW CONCERNING.

INDUSTRIAL HOUSING IN THE UNITED STATES. Industrial housing is usually understood to mean housing of workers by employers. The growth of the co-partnership movement in England and the strong advocacy of its introduction into the United States before the European War, and the federal government's own experiment in house building for wage-earners during the war compel a broader definition. Industrial housing to-day is housing which contributes to industry, no matter by whom erected or managed.

Using the term in its older sense, however, industrial housing has a history in the United States which begins with the establishment of industries outside the home. The first American cotton mill was erected at the falls of the Pawtucket in 1790. Its successors in Rhode Island and Massachusetts were scattered along the streams that furnished their motive power. Compelled to plant the mills at a distance from established seaboard and commercial towns, the pioneer manufacturers were also compelled to build houses to shelter their employes. So began the New England mill villages, some of the earliest of which still remain along the little rivers that empty into Narragansett and neighboring bays.

The houses in these villages were well built, and even to-day, when sanitary conveniences and a public water supply have been added, most of them meet modern requirements. Moreover, they are far from unattractive with their grassy open spaces, their gardens and their fine old trees. It was necessary in the days of pioneer industry to build good houses, for the only available labor was the Yankee farmer's boys and girls who had been prejudiced against factory work by the tales brought from England of the horrors of industrial life. So the early industrial villages of America were designed to prove that industrial life here need not duplicate that of the Old World. Nor were the employers satisfied with the erection of good dwellings, they gave even greater care to the management of those dwellings. Especially were the dormitories or boarding houses of the girls and unmarried women kept under most careful supervision, and rules were enforced that would satisfy strict Puritan parents. Even the family dwellings were kept under a close supervision which limited considerably the freedom of the tenants.

In the early days, however, this regulation, which went far into the details of life, was accepted not only because it assured a good moral tone for the new communities whose inhabitants were in the main young people, but also because the employers or their chief representatives were a part of the community and shared its life democratically. The factory girls of the day became the manager's guests in the evening. This combination of democratic paternalism did not last, however. Even before the advent of coal and of immigrants from

Ireland and the continent of Europe the system had begun to break down. Employees became restive at having the same man both employer and landlord. The strict regulation which was necessary at the beginning became irksome as the villages developed into established communities.

The use of coal as a source of power caused some of these villages to develop into cities, Lawrence, Lowell, Pawtucket; it caused others to disappear, the owners finding it advisable to move to a place where railroad or water transportation was more accessible. When the villages grew into towns or the mills were moved to towns, the commercial builder appeared. To him the employees frequently turned with relief even when his houses were not so well built or cost more than those of the mill.

The mill owner also frequently welcomed this opportunity to drop the rôle of landlord. For there had been gradually developing a gulf between employer and employed. Though in the early days an owner often lived in Boston or Providence, the common traditions of a New England ancestry served to bridge this distance. But with the coming of the Irish with their different traditions and their different standards of living, the bond was weakened. When to the Irish succeeded Poles and Italians and even peoples of the Levant, the old democratic fellowship in the enterprise usually vanished entirely. The Lawrences of the new era became "pay envelope" cities, even the managers and heads of departments made their homes outside the mill communities. Then grew up the conception that the employer's concern in his employees ceased at the mill gates; cottages owned by the mill stood vacant or were turned into storerooms.

But this sharp cleavage of interests also proved impractical. With no community of interest there could be little or no mutual understanding, and labor troubles increased. Coincidently housing standards declined. The speculative builder, having no motive other than to secure the greatest amount possible for his property, developed the wooden three-deckers in place of the cottages and crowded them so close together that in some of the mill cities not only did gardens and yards disappear, but the windows of one house were practically boarded up by the walls of its neighbors, and what were once alleys became the thoroughfares giving access to solid lines of rear dwellings. The mill owners and their chief lieutenants, living far away from these conditions, persuaded that the matter was no concern of theirs, left the community without its natural leaders.

Then again the pendulum began to swing back toward its starting point. Compared with the suffocating, swarming, ill-regulated industrial towns and cities, the remaining old spacious mill villages had a new attraction. In some of them were the descendants of the original operatives. So new industrial villages were founded, some by employers who thought that in this way they would prevent labor troubles, some by men inspired by the more altruistic motive of rescuing their workers from intolerable living conditions. The spirit of the founders varied from the extreme paternalism of Pullman, which led to disillusion and failure, to the liberality of H. O. Nelson at Leclaire, which is still bearing fruit. This new group of industrial villages contains several which are notable for their beauty.

At the time the World War began not only was the number of industrial villages increasing rapidly, but discussion as to methods of financing and management were producing results that promised to do away with most of the dissatisfaction under the old régime. The old method of individual home ownership was falling into disuse and organized labor had definitely pronounced against it. Direct ownership of the employee's home by his employer had satisfied neither party. A first step away from this was taken by the incorporation of subsidiary companies so that the dwellings were no longer managed from the factory office. A further step had been taken in two or three instances by an adaptation of the English copartnership plan by which the tenants were gradually to become stockholders in the company that owns the houses. Then came America's entrance into the war.

During the years 1917–18 the United States government embarked upon a great experiment, the erection and management of wage-earners' dwellings. The signing of the armistice in November of the latter year left the experiment far from complete. One of the Federal agencies, the Emergency Fleet Corporation, had carried some of its developments to a point approximating physical completion, a small proportion of its dwellings were actually occupied. The other Federal agency, the United States Housing Corporation, handicapped by a later start, had not yet housed a single workingman's family. Neither agency had worked out a plan of management, though they had agreed for the time being not to sell any of their holdings. The Emergency Fleet Corporation controlled its properties through subsidiary corporations of the various shipbuilding companies through which it operated. The Housing Corporation owned its properties itself. The signing of the armistice led to some curtailment of the Fleet Corporation's housing developments, though in the main these were carried through, as shipbuilding did not cease with the war and the new dwellings were needed to hold the workers. The Housing Corporation, however, not only curtailed its projects, but wherever possible without too great loss, cancelled them entirely.

In spite of the failure to carry this great experiment to completion it exercised a considerable influence in various ways. First and most important it gave a notable impetus to the movement for government aid which before the war had been making only a slow and uncertain progress, Massachusetts being the only State in the Union which had committed itself, and it had done so only to the extent of $50,000 with which a small group of houses were built at Lowell. The war, however, demonstrated clearly both the vital importance of good housing to productive industry and the inability of private builders to meet the need. Second, it brought into the service of the wage-earner some of the leading architects, engineers and landscape designers of the country, who both because of lack of private work and the call of patriotism, for the first time turned their

thoughts to the needs of men of small means.

The reverse side of the shield was financial. The need for the houses was urgent. Good planning, good designing, took little more time than no plan or design, perhaps rather less as they practically compelled an orderly procedure which prevented confusion and false starts. But speed forced into the background all thoughts of economy. The houses, with the exception of those in a few of the earlier developments, were good, but when completed their cost was high. This left a financial problem which cooled the ardor of many who otherwise would have been tempted to imitate the government's villages.

Yet the effect was notable, not alone in that these government-built villages have set a high standard by which to measure other industrial housing developments, but by breaking the taboo which had prevented government aid to housing in America, almost universal, though this long had been in other parts of the world.

In this article nothing has been said of the mining villages, which form a group by themselves. As with the pioneer industrial villages, the mining towns were of necessity built by the companies because they must be located with reference only to the mine. With them, however, there was the additional reason that their life was uncertain, depending upon the time it might take to exhaust the mine. This second reason also led to a policy of making these towns as cheap as possible, so they became a by-word for their squalor and ugliness. Yet before 1914 the new interest in industrial towns had affected them and great improvement had begun. See also CITY PLANNING; GARDEN CITIES.

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INDUSTRIAL HYGIENE. The policy of providing healthful and comfortable working quarters for employees in commercial and manufacturing establishments has been developed within comparatively few years. Previously little thought was given to such matters and, in factories especially, operatives were crowded together in any kind of a shop that chance or a desire for economy might provide and the fact that many of these working places were both dismal and unsanitary had but little weight with the average employer.

To-day these conditions are changing so rapidly that poorly lighted, inadequately heated, improperly ventilated or otherwise unhealthful workshops are coming to be the rare exceptions to the rule. Instead, in the average shop, adequate toilet and washing facilities are now provided, problems of lighting and ventilation are solved by expert engineers, even such questions as the regulation of heat and humidity being given serious consideration, and every effort is made to see that the working conditions are such as not to impair the health and efficiency of the employee.

While the matter of hygienic and sanitary equipment has been fixed to a great extent in New York, New Jersey, Pennsylvania, Massachusetts and Wisconsin, where the legislatures have enacted laws setting a standard, not only for industry as a whole but, in many instances, for particular branches of industry, the improvements in these directions are in no sense confined to establishments that have been compelled by statute to adopt more modern methods. Even in communities that are unregulated by law or industrial code, similar improvements are constantly being made, for experience has so clearly demonstrated that these changes in working conditions quickly pay for themselves in the character of the service performed by the working force that even those employers who feel that they owe no such moral obligation to their employees have learned the lesson that proper hygienic and sanitary workshops make for greater and better production, and are

	Lavatories	Toilets	Drinking fountains	Lockers
Type	Individual	All porcelain; no wood	Bubbling type, arranged so lips do not touch metal.	Perforated metal, slanting top to prevent accumulation of refuse.
Located	In central building near lockers.	Substations near workers.	Where convenient to workers.	In central building.
Number	1 for 15 men	1 for 20 men	1 for 30 men	1 per man. If possible, one compartment for work and one for shop clothing.
Accessories	Hot and cold water, liquid soap, paper towels.	Automatic flush		Locked. Forced hot air ventilation to dry wet garments.
Plumbing	Open type, plain.			
Special features	Porcelain	Must have forced air ventilation.	In clean, light places.	It is advisable to arrange locker so that men coming off work at same time have every second or third locker to prevent crowding.
Note	Average time per man at washbasin 2½ minutes.	Compartments should not have doors as easier to keep clean.		If lockers are near washbasins a larger number can use both without waiting.

taking the steps necessary for the adoption of the methods that are everywhere proving so mutually advantageous.

In fact, these questions have assumed proportions of so great importance that, in several instances, employers' associations have conducted thorough surveys and adopted standards for the improvement of working conditions, even in communities unaffected by legislative statute. For example, the Welfare Managers' Group of the Detroit (Mich.) Executives' Club made a survey which included all of the important plants in that city, and, as a result, the preceding sanitary arrangements were suggested as necessary for the proper equipment of a manufacturing plant.

The committee also reported:

"The objections to paper towels, 'that we do not get our hands dry enough to prevent chapping,' can be done away with by a well-ventilated, warm dressing room, where the hands will dry while dressing. Where there are corners into which waste paper and refuse are thrown this can be largely eliminated by painting these corners white and lighting them well. One does not throw waste into clean corners. Tile floors should be laid in all washrooms, etc., where possible; otherwise, cement, well drained. Oily floors should be swept and scraped daily. Where cement floors are used, rubber pads for the men to stand on will help in increasing comfort and efficiency. All scrap metal should be kept clear of the workers."

The Detroit committee also included "good lunch room and recreation facilities among our prophylactic treatment," on the ground that properly prepared, carefully selected food and healthful recreation are important factors in the development of an effective hygienic and sanitary program.

In plants where workers are exposed to dangerous dusts or noxious fumes the installation of a lunch room is regarded as most essential, as all authorities agree that the cold luncheon eaten in the workroom, or in an unpleasant environment, must have a direct effect in reducing the physical fitness necessary to production. Where lunch rooms are not provided, it is advised that gas stoves or steam tables on which foods brought from home may be heated should be installed, and it is declared that even the policy of furnishing nothing more than milk, coffee, tea or soup at a nominal charge has invariably been found an economy to the employer. Where lunch room facilities are provided, however, care should be taken to see that the food served is of excellent quality, both in material and method of cooking, for otherwise it would be difficult to overcome the temptation to hurried eating, but it has generally been found that where food is selected for its nutritive value and is prepared with a view to ready digestion, satisfactory improvement in the health of the working force is noted, with a corresponding reduction of time lost through illness and intemperance.

While the part played by fresh air in the prevention of occupational disease is generally admitted, the vague character of the standards in vogue in different States has proved a great handicap to the manufacturer who is desirous of adopting the system best suited to the needs of his operatives. As Roach points out (*Industrial Management*, October 1917): "The terms 'adequate' and 'sufficient' have left him free to spend thousands of dollars on experiments, the results of which have too often given little of the protection to the health of the worker promised by irresponsible contractors."

Expensive systems of air conditioning are naturally unnecessary in the ordinary workroom where nothing more than fresh air is needed, and they are rarely installed except where the process of manufacture requires absolutely dustless conditions or a stable degree of humidity. For ordinary purposes, draft deflectors placed at both top and bottom of windows afford satisfactory ventilation.

While plants with non-dusty processes often find this window equipment all that is necessary for ventilation, it is admitted that it cannot be depended upon where noxious vapors or excessive humidity have to be considered. The same objection can be made to so-called "natural draft" ventilators, which, while they often work satisfactorily when there is a sufficient breeze present, fail to accomplish their purpose on humid days when the noxious air lies close to the floor.

Where industrial dust or vapors must be removed from the air the adoption of the most approved dust exhaust system becomes necessary. In this connection Roach says:

"The usual and inexpert practice in building a dust exhaust system, such as is required for buffing, polishing or grinding wheels, is to proportion the main section pipe so that at all cross-sectional points it only equals the combined areas of the entering branch pipes; while the inlet of the exhauster used on such a system has an area that but equals the combined areas of all the branch pipes used on the system. For example, for 25 4-inch branch pipes the largest diameter of main pipe and exhauster would be 20 inches. A 50-inch exhauster would have an inlet 20 inches in diameter; if it were necessary to get a suction-head at each branch pipe sufficiently strong to displace 2 inches of water in a pressure gauge (commonly called a U-shaped tube) it would require an actual velocity of 4,000 lineal feet per minute in the branches, and it would be necessary for the exhauster to handle 8,720 cubic feet of air per minute. It would require approximately 16 horse power to obtain these results, which in itself is an important item.

"This kind of a system should no longer be permitted. Standards based on actual working tests and experience prove that efficiency requires for 25 4-inch pipes a main pipe with an area 20 per cent larger at all its cross-sectional points, than the combined areas of entering branch pipes. The inlet of the exhauster attached to the system must have an area 20 per cent larger than the combined areas of all the branch connections on the system. This kind of system would require a 55-inch exhauster having a main pipe 22 inches in diameter and, to obtain a suction sufficient to displace 2 inches of water in a U-shaped tube, the air in each branch pipe would be obliged to have a velocity of 4,000 lineal feet per minute. The exhauster would handle 8,720 cubic feet of air a minute and would take about 12 horse power to operate it."

In many plants the hygienic and sanitary

control is in the hands of the industrial physician whose duties comprise a more or less close supervision over the physical condition of the operatives from the day they enter the employ of the company. Many concerns have adopted the policy of examining all applicants for employment before engaging them, with a view to determining the physical fitness of the man for the job which he is to be expected to perform; a smaller number of establishments insist upon periodic re-examination, in order that his physical defects may be detected as quickly as possible and he may be assisted in remedying them, while all employers who employ the physician have found that his services in accident prevention and general health supervision have proved of sufficient value to more than offset the cost of the service. So well established has this fact become that even plants that are too small to employ a permanent physician have established dispensaries, where they meet all requirements for first-aid through a plant nurse, the physician being called upon for examinations, or, when necessary, for more important services.

According to the report of the committee of the Detroit Executives' Club, a plant employing from 1,400 to 2,000 persons should devote three rooms to hospital purposes — a reception room, an examining room and a surgery or dressing room.

"The furniture needed in a reception room is enough chairs so that patients will not have to stand, and a stretcher. The examining room should have a rest cot, scales and other instrumental equipment, with two or more booths to facilitate examinations. The surgery room needs an operating table, an instrument case with necessary first-aid instruments, drugs and dressings, one or two pedestal wash basins and one waste can."

So general has health supervision become in industry that the physicians engaged in such activities have organized an association, the Conference Board of Physicians in Industrial Practice, and it was in their behalf that Magnus W. Alexander, in August 1917, published his report on the "Cost of Health Supervision in Industry."

The purpose of this report, as its compiler stated, was to inform employers of the actual cost of health supervision in the different industries. "To this end, the data were secured from plants engaged in many industries, in light, medium and heavy work, in comparatively safe as well as hazardous occupations, and in shops of various sizes and character, located in various parts of the United States. . . . The chief significance of these data, from a general viewpoint, is that it is possible to give such a large amount of medical and surgical service at a cost which averages only $2.21 per employee per year. . . . Where the average cost appears to be unusually high . . . the size and character of the medical staff is usually the determining factor. In some cases the cost is influenced greatly by the number of injuries treated in private or public hospitals, in others, by the amount of care given to all injuries, whether serious or slight, or by the extension of the service to include physical examination of all employees, treatment of sickness of employees at the plant and at home, and even by medical care of employees' families, or by a combination of all these features."

Mr. Alexander concludes his report with the statement that "convincing proof of the economic value of health supervision in industry is afforded by the fact that it was found that no employer had abandoned the health supervision activities established in his plant. On the contrary, the prevailing tendency has been to invest even more money in extending the service."

A summary of the report is as follows:

INDUSTRY	No. of establishments reporting	Total average number of employees	Total cases of all kinds	Total medical and surgical cost	Average annual cost per employee
Metal trades	47	294,646	1,988,991	$541,771	$1 84
Rolling mills	7	49,317	358,574	137,047	2 78
Smelting and refining	1	1,270	2,832	6,932	5 46
Light and power	7	24,921	49,046	92,601	3 72
Transportation	5	35,795	81,591	69,633	1 95
Chemicals	6	10,572	78,744	34,797	3 29
Food	5	13,650	69,565	39,875	2 92
Rubber	5	27,462	234,069	76,089	2 77
Textiles	4	8,939	67,380	24,177	2 70
Paint	2	4,023	10,255	29,635	7 37
Leather	2	3,026	9,440	6,102	2 02
Publishing	2	3,358	6,742	3,473	1 03
Coal mining	1	2,454	2,842	4,637	1 89
Gold mining	1	2,500	62,126	35,590	14 24
Coal and iron mining	1	11,000	131,898	130,000	11 82
Miscellaneous	3	2,611	11,019	6,126	2 35
	99	495,544	3,165,114	$1,238,485	$2 50

In several plants in this country, health supervision includes the care of the teeth and eyes, examinations being made by specialists in the employ of the firm; subsequent treatments usually being at the expense of the employee, though at greatly reduced rates.

The adoption of sanitary standards was the means taken to overcome the "sweat-shop" conditions that had operated so injuriously to several branches of the tailoring industry and, wherever there has been sufficient organization to adopt and enforce such regulations effective results have been reported. The standards adopted by the Joint Board of Sanitary Control in the cloak, suit and skirt industry of Greater New York forbid cellar shops and tend to prevent the establishment of workrooms under conditions that might prove injurious to health. They provide that shops located in buildings more than one story in height must have fire-escapes properly equipped with ladders to an adjoining building or with carefully adjusted full-length drop ladders. Where automatic sprinklers are not provided, there must be a sufficient number of chemical extinguishers or fire-buckets, and special caretakers should be appointed in each shop to see that the fire-buckets are kept filled and are ready for use in case of fire. No smoking is permitted in the workshops, doors must not be locked during working hours, signs marking exits and fire-escapes are to be conspicuously placed about the shop, fire-proof receptacles with tin lining and covers must be provided for

rubbish, all openings and exits to fire-escapes must be left unobstructed by tables, machines, partitions or iron bars, and stairs are to be provided with secure handrails and safe treads.

As to lighting, the regulations stipulate that there shall be sufficient window space to ensure that the shop shall be well lighted from 9 A.M. to 4 P.M.; where artificial illumination is needed, arc-lights or incandescent mantles shall be used for gas, and all lights should not only be well shaded, but should be placed above the operatives and not too near them.

In the matter of ventilation it is provided that at least 400 cubic feet of space, exclusive of bulky furniture and materials, shall be provided for every person within the shop, and all work-rooms are to be thoroughly aired, before and after work hours and during the lunch hour, by the opening of both windows and doors.

Other regulations provide that (1) no coal shall be used for direct heating of irons, and where stoves are used for this purpose they must be surrounded by a metal sheet at least five feet high; (2) walls and ceilings of shops and toilets should be kept clean; the floors to be scrubbed weekly, swept daily and kept free of refuse, while the toilets should be flushed. It is advised that a special caretaker should be designated to oversee this work. (3) A sufficient number of water-supplied wash-basins are to be provided in convenient and light locations; (4) separate dressing rooms are to be provided for the sexes, with suitable hangers for the street clothes of employees; (5) there shall be separate toilet arrangements, with solid partitions from floor to ceiling, as well as separate vestibules and doors, and (6) all seats provided in the work-rooms are to have backs.

JOHN R. MEADER.

INDUSTRIAL INSURANCE. See INSURANCE, INDUSTRIAL.

INDUSTRIAL ORGANIZATION AND ADMINISTRATION. In the consideration of the organization and management of manufacturing establishments let us, after glancing at the evolution of American business administration, divide the subject into three parts, namely, the handling of finances, the administration of the manufacturing processes, and the control of the personal relations. The management of the selling and advertising functions, which should be considered in a general review of the subject, are treated under the heading INDUSTRIAL DISTRIBUTION.

Historical Review.— In the early decades of American business, the organizations used for administrative control were of the simplest character. Private and family-owned enterprises or small partnerships operated plants which might be described as shops. The first large undertakings, which required the corporate form, and which necessitated any considerable formality of financing, were the toll-roads, canal companies and the railroads. The chief factor which caused an increase in the size of businesses during the half-century 1840–90 was the invention of machinery. The large-scale operation which machinery and the use of mechanical sources of power suggest has been realized because of the enormous domestic market, the ample capital available, the freedom of the country from tradition and the existence of a spirit of daring. By the decade 1895–1905 these experiments had sufficiently developed the technical aspects of manufacturing, that engineers could boldly plan groups of specialized plants under united control. Meantime the accountants had learned how to keep untangled the most heterogeneous affairs; and the distributive or marketing machinery was devised for handling the entire domestic market in a single campaign. Since the possible economies from the elimination of competition were very large, there occurred the so-called "trust movement," which resulted in the consolidation of many hundreds of individual plants into a small number of great consolidated corporations. In the process of putting these enterprises together, and of operating them, the art of corporation financing, and its underlying technique of accounting, have achieved a forced growth. Overlapping this period in part, but operating most intensively from 1910 to 1914, there occurred the movement known as "scientific management." Broadly speaking the purport of this movement is that a group of engineers applied the precise and systematic methods of investigation and calculation recognized in the engineering sciences to the study of shop processes, and that by so doing they uncovered astonishing inefficiencies and were able to recommend a system of functionalization of shop executives and a policy of standardization upon the best methods which systematic study should discover. Scientific management is an effort to apply the scientific method to a certain portion of shop practice. It met with determined opposition because it did not adequately apply the knowledge and spirit of the times in its handling of the wage-earner. A further account of this movement may be found under the heading SCIENTIFIC MANAGEMENT. At the present time the interest of business executives in the evolution of new methods centres upon "human engineering." There has been an accumulation of knowledge concerning hygiene and public medicine, the causes of fatigue and accidents and the wastes of the hiring-and-firing methods in vogue, which demands application. It is realized that men should be carefully chosen for their work and given special training for it. Organized labor has enforced the idea upon the public mind that the laborer should have a voice in determining the conditions in which he works. And finally there are new ideals of the square deal and of service which are making their way among the more advanced employers.

Departments of Business Administration. —The ordinary functions of business administration fall into four classes: (1) Financing — in charge of the chief officers, working in close relations to the board of directors. (2) Manufacturing — in charge of a general manager or superintendent, directing a corps of foremen in the shops. (3) Selling — under the direction of a sales manager, with district agents and salesmen. (4) Personnel Relations — in charge of an employment manager or superintendent of personnel.

Financial Organization and Management. — If the inauguration of a business take the usual course of large modern enterprises, there will first appear upon the scene a promoter,

who discovers undeveloped properties or poorly-managed concerns, forms a plan for their development, secures options upon them and puts his project before capitalists. Capital may be represented by a syndicate manager, who acts for a group of banks and large private investors in investigating the projects presented. If a project be found meritorious, its financing will be taken over on conditions which ensure adequate control of the subsequent operations of development. A corporation will then be formed which, under its charter powers, elects officers, enters into contracts, issues securities, receives funds, secures plant and equipment and otherwise prepares to do business.

The liabilities of a business corporation may be briefly listed as bonds, short-term notes, preferred stock, common stock, commercial paper and open accounts. The bonds of manufacturing enterprises (unless the business of certain public utilities be included therewith) should represent but a small fraction of the total capital, for the reason that the earnings of such businesses have, in the past, been subject to violent fluctuations. Preferred stocks are a business man's risk. They may be described as intermediate in security between bonds and common stocks. They will, in many cases, represent the cash and property contributed to the business by the group of interests connected with its organization and development. Common stocks receive dividends only after interest on the bonds and dividends on the preferred stock have been paid. There is no margin of safety to protect them. Their hazard is not so much the correctness of the process of valuing assets as it is the skill of the management in earning income. They are an appropriate investment only for men of means who are intimately associated with industrial management.

The financial authorities of a business are responsible to allot the funds raised from the issue of securities as advantageously as possible to the various requirements. A portion will go into buildings and equipment and other relatively permanent forms. This may be designated as fixed capital. Another portion must be reserved for raw materials, finished stock, pay roll and credit advances to customers. This is circulating capital. Fixed capital loses value slowly as a result of wear and tear. Circulating capital changes its form of investment rapidly. A balance in the bank last week may have been paid out as wages and be now represented by goods in the warehouse. Next week, if the goods are sold, it may take the form of a credit advance to a customer.

As fixed capital is relatively enduring, a large amount of funds should not be put into such a form until it is certain that the enterprise is to be of a permanent nature. Fixed capital may be of various degrees of specialization. The more specialized the form the more difficult it is to sell, and the more its selling price depends upon the hazard of a single set of market conditions. The degree to which it is proper to specialize capital is a function of the conference felt in the soundness of the project. The utilization of fixed capital is a process requiring the continuous supplying of circulating capital. Materials and labor must be provided to support the process of production. A plant is valueless when not in motion. To keep it under headway money must be constantly poured into it in amounts which in the average case may equal the total capital of the business annually. It is a somewhat common error of business finance to place an unduly large proportion of the assets in fixed form. The homely caution of Poor Richard may well be remembered, "It is easier to build two chimneys than maintain one in fuel." The financial organization of a private business connects with the general financial machinery of the country through the company's published reports, through the certified public accountant who vouches for the report he signs and through the general banking system. It is further connected by the investment bankers who purchase the securities after investigation and sell them to the investing public, by the stock exchanges which exert some slight control over the probity of the methods of the corporations whose securities they admit to listing privileges, by State commissions which are rapidly taking over the functions of authorizing security issue and by the general machinery of law.

Administration of Manufacturing Processes.— The highest authority in a business, on matters pertaining to productive processes, may be known as the general superintendent or works manager. In the initial stages of the business this officer will have the leading influence in determining the location of plants, the layout and character of buildings and the selection of machinery. When preliminary plans result in the construction of a mechanical automaton, and it becomes necessary to add men and materials and to indicate methods of production, in order that the enterprise can become a going concern, the general superintendent will take on a much expanded range of responsibilities. He will be expected to keep the physical equipment and productive processes up to standard and to employ an adequate force of foremen, laborers and skilled men of the various crafts. He will control the progress of work in relation to the demands of the sales department by a schedule and a system of orders, which control all productive labor and the use of material. The design of articles and the accuracy of manufacture is effected through a designing department and a system of inspectors. As a means of improvement he will use time studies and motion studies. The information thus accumulated he will embody in standards, which will be promulgated as the prescribed methods. The ideal is standardization, which is such an effective control of performance that every case conforms to the rule laid down. These prescribed methods will be communicated by general or standing orders and by shop orders. In a business of any size, orders should be written. The standing orders, when gathered together, will compose a "book of rules." The shop orders will be supplemented by instruction cards, to convey precise information as to the materials to be used, the machine or tool to employ, the process to select, the time the task should take, the machine adjustments, etc., etc. A particular instruction card will be prepared in advance for each task, and will be issued from the planning room, for the workman's convenience, each time the job is given out.

The planning room is the chief service aid of the superintendent and the foreman on technical matters. It may, in a typical instance, contain a routing or order-of-work clerk in charge of the planning board, an instruction card clerk, a clerk in charge of time slips and cost records; and it will probably serve also as headquarters for the engineer who calculates the proper speed of machinery, and the time study man who studies manual operations.

From the foregoing statement of duties it can be seen that the general superintendent has a very wide range of responsibilities. To be able to function efficiently, in the face of the enormous evolution of science and technique which has taken place in recent years, he should confine himself to general supervision, entrusting details to a staff of specialists. There has grown up in the best-managed businesses a number of service departments or staff aids for the express purpose of relieving the general superintendent. Such are the tool room, the stores department, the engineering department, the designing and drafting room, the inspection department and the planning room. Usually also the cost department and the employment department will be answerable to him. To a considerable degree the difference in efficiency of manufacturing enterprises depends upon the ability of the superintendent to comprehend the functions of service departments, and his success in organizing about him a staff of specialists who relieve him and his foremen. An executive blockade exists in many businesses because the general superintendent and foremen are overloaded. The remedy is to apply the principal of specialization and division of labor in administration, as it is applied among the craftsmen and common laborers in the shops.

Administration of Personnel Relations.— Within the last 15 years, the attention of business executives has been increasingly drawn to the problem of employment management, or as it is sometimes called, «human engineering.» For years the demand of labor organizations, and the waste and violence of strikes, have made the «labor problem» synonymous with a class contest over the sharing of the product. Recently, the relation between employer and employee has begun to take on a different character. It has been found that a great many things can be done which will benefit both. A field of harmonious policies has opened itself. The labor problem begins to appear to be a matter of the careful selection of men for their work, the provision of comfortable working conditions, the prevention of accidents, the safe-guarding of health, the careful setting of wages on the basis of an honest study of all the facts, including the cost of living, and a variety of activities which develop interest in work, loyalty to a common cause, and the mutual welfare. Experience has proved that these problems can best be handled by having a separate department of the business, which can devote itself to them; and by putting in charge of this department a first-class executive. The movement to install such officers is a resultant of progress in accounting, staff organization, functional foremanizing, vocational guidance, industrial training, the new wage systems, safety first, hygiene and medical aid, and the use of the committee system of shop management. The functions of the employment department are, for the most part, not new in industry. They are now being gathered together under one authority so that they may be handled in a more expert manner, that they may be harmonized into a consistent policy, and that they may be made the definite responsibility of competent officers. Among the causes which are responsible for the attention now being given to personnel supervision is the extension of cost accounting to the factors which influence labor efficiency. The cost of labor turnover is being calculated. The cost of accidents, of sickness, of absenteeism, of improperly placed men and of strikes is being studied. The employment manager is, in one sense, a labor-cost accountant. The organization of an employment department does not involve an increase in the cost of doing business. On the contrary, it means an economy, by reason of a reduction in the number of persons to be trained, a saving of foremen's energy, a reduction in accidents and a gradual increase in the average skill and experience of employees. Proper employment conditions attract superior workmen, and generate a co-operative spirit; this affects favorably the rate of production, the waste of stock and the quality of output. See LABOR TURNOVER.

The employment manager is necessary to apply the art of mental testing and vocational guidance in ascertaining the fitness of prospective employees. He best can direct industrial training to provide the talent which the employment records show to be most needed. He knows the process of establishing fair base rates of wages, of working out wage scales, of checking minimum rates against the local cost of living, and of planning simple and specific production bonuses. The employment manager has come in with safety first, because it has been found that three-fourths of the accidents are due to the carelessness or ignorance of the working force. His department works along the lines of hygiene, sanitation, medical aid, canteens and health education, to cut down accidents, reduce fatigue and cure antagonism of mind. Employment supervision represents a movement in the direction of the democratic shop, in which a voice is given to labor in determining the working conditions. It is a means of applying that conception of truth and service which has revolutionized selling and advertising. As the customer is «sold» goods — that is to say is thoroughly convinced and satisfied — so a workman is «sold» his job. The latter has to be satisfied as to the task, the working conditions, the wages and the general policies, before he becomes a genuine employee.

The employment manager is coming in as a new staff man to relieve general executives. Staff or service departments are already familiar in the form of accounting departments, statistical departments and the like. This principle of staff service is now being carried over into the field of human engineering. General executives are demanding well-chosen men, men who are free from accidents and in sound health, men satisfied with their pay, and men

so treated that they form a permanent and contented force, ready to co-operate loyally in the general plans of the enterprise. Of all the standardized agencies a service department can furnish to a general executive, the greatest is a first-class man. In a somewhat analogous way the employment manager represents a step in specializing the work of the foremen. His coming makes the foreman less of a jack of all trades, just as the coming of the tool room, the stock room and the designing department did. Under the new system, the foreman can no longer sell jobs, or protect pets, or cover up his own incompetence by discharging a man. When the foreman becomes accustomed to the new system he finds it a great relief. He gets a more even and dependable run of men than he could provide for himself, and he is free to become an expert in shop processes. See EMPLOYMENT MANAGER; EMPLOYMENT MANAGEMENT.

EDWARD D. JONES,

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INDUSTRIAL ORGANIZATIONS, Foreign. See LABOR DEPARTMENTS, FOREIGN; LABOR LEGISLATION, FOREIGN; LABOR ORGANIZATIONS, FOREIGN.

INDUSTRIAL PEACE, Experiments in. The desire to find a common ground of understanding between capital and labor with a view to reducing the enormous financial wastage resulting from needless labor strikes is the purpose back of every experiment in industrial peace that has been inaugurated during the past 20 years. The first efforts in this direction assumed the form of some type of profit-sharing, the idea being that the prospect of sharing in the profits of the employer would appeal to the self-interests of the workers and so inspire more loyal and efficient service. Theoretically, the idea appealed to many practical men, and various developments of the profit-sharing scheme have since been carried out. The failure of many of these projects has not had a permanently discouraging effect upon those who favor some such form of co-operative business effort, chiefly because of the fact that, in at least a majority of cases, the lack of success can be traced to local causes which proved stronger than the principles involved. Thus, the attempts of employers to use the profit-sharing ideal for advertising purposes or as a means of evading appeals for increases in wages, have invariably proved disastrous. At the same time, some of the largest concerns in the country have adopted this form of rewarding their employees, and with such satisfactory results that it is still in force. One reason why the number of failures charged against the profit-sharing idea is so great is that so many schemes that cannot properly be called profit-sharing have been classified under this designation. Thus, numerous forms of co-operative effort, including plans for participation in stock ownership through instalment purchase, bonus systems, pension schemes, and various projects of a welfare character have erroneously been classed as "profit-sharing."

The term "profit-sharing" was first defined by the International Co-operative Congress, which was held in Paris, in 1889, and was stated to be "an agreement freely entered into by which the employees receive a share, fixed in advance, of the profits," while the term "agreement," as used in this connection, was defined to cover "not only agreements binding in law but as including also cases where the agreement is only a moral obligation." The term "profit" was defined as "the actual net balance or gain realized by the operations of the undertaking"; "a share" as "a sum paid to the employees out of the profits," such share to be "dependent upon the amount of the profits" and "not indeterminate," or, in other words, "it must not be a share which an employer fixes, at the end of some period, at his absolute discretion, as distinguished from a prearranged basis," while the proportion of the total working force of a concern that must share in the benefits before real profit-sharing conditions can be established was declared to be "not less than 75 per cent." Making allowance for certain elasticities in interpreting this definition, necessitated by typically American conditions, the United States Bureau of Labor Statistics (Bulletin 208) reports that it found 60 genuine profit-sharing plans in operation in the United States. Of these, seven were established prior to 1900 while 29 have come into existence since 1911 and 21, or about one-third of the number, in the three years between 1914 and 1916. More than three-fifths of the concerns operating on a strict profit-sharing basis were located in three States, New York, Massachusetts and Ohio. Since the publication of this report, the number of plants adopting some form of genuine profit-sharing has been considerably augmented and advocates of this method of securing closer co-operation between employer and employee believe that the next government report will show more favorable conditions, not only in an increased rate of distribution but in other results more definitely indicative of the general practicability of the plan.

The National Association of Corporation Schools reported, in November 1918, that a recent survey of profit-sharing schemes showed that 39 plans had been abandoned, 10 because of labor troubles and strikes; seven because the employees were dissatisfied; five because the employers found that they operated unsatisfactorily; five because of failure under diminution of profits; four on account of lack of appreciation on the part of employees; two because of changes in business management, and one because the employees sold out their stock on a war market. The reasons for eight abandonments was not stated.

The Corporation School Bulletin states (November 1918) that while it is difficult to eliminate all the obstacles enumerated, they may be gotten around, and "in this," it continues, "we are making some progress through careful study of the operating conditions and of the factors and fundamentals underlying each particular business. We are learning through our mistakes. Workmen are being classified and consideration is being given to what is just and fair to each class of employees. The reward is being fixed in proportion to certain definite desired accomplishments, in regard to output, the cost of production and other factors the value of which to the firm concerned can be figured. In consequence

it will be possible to determine just what the share of each class of employee should be in producing the desired results and to reward accordingly — a decision which, in its turn, must lead to the reward of individuals in each class in proportion to the individual results obtained by workmen, foremen, superintendents, salesmen and managers, together with a greater confidence on the part of both employers and employed in the intrinsic justice of the movement itself."

A comparatively recent development of the profit-sharing ideal is in operation in Louisville, Ky., where, in addition to paying employees as good compensation as would be paid for the same class of work in any other industry, all workers receive a division of the total net profits, 50 per cent being placed to the credit of the regular surplus or reserve fund from which dividends for the stockholders are declared, while the remaining 50 per cent is divided in three equal parts: One-third being allotted to the executives, one-third to the manufacturing and recording division and one-third to the sales division. In distributing the allotment to the workers and clerical force, the weekly or monthly wage of the individual is used as a basis for calculation, the assumption being that a man who is paid a weekly wage of $25 is of more value than the man who received $18 a week, and, therefore, is entitled to a proportionately greater share in the profits. This is, perhaps, one of the simplest and most generous forms of profit-sharing reported. From this 50 per cent participation plan the rate of distribution ranges down to about 2 per cent of the earnings of the employee.

The Rockefeller plan for the maintenance of industrial peace developed as the result of the serious labor troubles which were encountered by the Colorado Fuel and Iron Company, in 1913. To prevent a repetition of these disturbances, John D. Rockefeller, Jr., representing the Rockefeller interests, the largest stockholders in the company, visited the mines, quarries, steel works, timber properties and other activities of the corporation, and, after familiarizing himself with actual conditions, with the assistance of the company's sociological department, drafted a plan for a form of industrial democracy that has operated so successfully that a similar system of workers' representation was provided for the employees of the Standard Oil Company, in March 1918. The unique feature of the Rockefeller plan is that it provides the machinery through which grievances and suggestions as to working conditions may be brought to the attention of the proper executives. While this is a matter that can more easily be arranged in smaller concerns, it represents one of the most serious problems with which large corporations have to deal, and Mr. Rockefeller is the authority for the statement that this method of meeting this difficulty has operated satisfactorily to the operatives as well as to the officers of the company. Under this plan, employees are given representation through delegates elected by secret ballot, and these representatives are not only empowered to settle with the officers of the company any grievances which may arise from time to time, but also participate in the regulation of all matter of welfare through joint committees on industrial co-operation and conciliation; safety and accidents; sanitation, health and housing, recreation and education. Regular district conferences between the employees' representatives and the company's officers are held, and it is guaranteed that, on these occasions, all matters of concern to the workers shall be discussed. The plan provides elaborate machinery by which the rights of an employee who has a grievance may be properly safeguarded, means being arranged through which disputes that cannot be settled otherwise may be taken as far as the president of the company, if necessary. The discharge of employees is also arranged under agreement with the employees' representative and can be only for causes previously agreed upon and posted where each worker may become familiar with the conditions. These include:

(1) Violation of the law; (2) Violation of prescribed safety rules and regulations; (3) Insubordination or use of profane or abusive language; (4) Absence from duty without notice except for sickness or other causes beyond the operative's control; (5) Harboring disease that may endanger the health of others; (6) Changing working places without orders or prowling around the works from assigned places; (7) Falsifying or refusing to testify in investigations of accidents or for false statements at time of application or physical examination; (8) Neglect or carelessness resulting in damage to railroad equipment; (9) Robbing railroad journal boxes of waste; (10) Wilful neglect in care or use of company's property; (11) Obtaining material on fraudulent orders.

The results of the operations of this plan are reported by Mr. Rockefeller (in 1918) to be as follows:

(1) Uninterrupted operation of plants and increased output; (2) Improved working and living conditions; (3) Frequent and close contact between employees and officers; (4) Elimination of grievances as a disturbing factor; (5) Good-will developed to a high degree; (6) The creation of a community spirit.

Mr. Rockefeller also declares that the "representatives of the men in the camps and mills have assured me that all grievances have been adjusted to the satisfaction of the employees, are in process of adjustment or the employees have been convinced that their grievances were not well founded. The representatives have expressed their own unqualified endorsement, approval and appreciation of the plan, which attitude, they say, is that very generally of the rank and file of the men, who constantly value the plan more highly as they understand its working better."

The application of this plan of co-operation to the Eagle (New Jersey) works of the Standard Oil Company occurred in 1918. At an election held on 27 March, 14 delegates were elected to represent the employees and the first meeting between these representatives and the officers of the company was held on 1 April. At the election, 92.2 per cent of the total number of wage-earners voted.

As in the West, the operation of the plan in Bayonne, N. J., is supposed to guarantee to each worker full justice and protection in all his rights. Future wage adjustments will be made in joint conference between the representatives of the workers and the company's officials, while discharges and suspensions are permitted only under similar conditions as those which exist in the Colorado Fuel and Iron Company, and any employee who feels that he has been unjustly treated or who thinks he is subjected to unfair conditions may through his elected representative appeal to the general

superintendent, or even to higher officials of the company.

The so-called profit-sharing plan of the Ford plants has been in operation since 12 Jan. 1914 and has proved successful, not only by increasing the stability of the working forces but also by bringing about a marked improvement in the morale of the organization. At the time this plan was adopted, it was widely announced that Henry Ford had established a minimum wage of $5 per day, but this statement was not strictly true as participation in the new rate of wage was confined to those who, in the opinion of Mr. Ford, were capable of using it "within limitations." The actual minimum wage, at the beginning of 1914, was fixed at 34 cents per hour. To those who could comply with the conditions imposed by the Ford plan, additional remuneration in the form of a share of profits was paid, the minimum share of 28½ cents per hour bringing the minimum earnings to 62½ cents per hour, or the widely-advertised $5 per day. The employees considered as possible participants in the profit sharing were classified in three groups: 1. All married men living with and taking good care of their families. 2. All single men, over 22, of proven thrifty habits. 3. Men under 22 years of age, and women, who were the sole support of some next of kin or blood relative. These restrictions were established because, as John R. Lee, one of the executives of the Ford Company, has stated: "it was clearly foreseen that $5 a day in the hands of some men would work a tremendous handicap along the path of rectitude and right living and would make of them a menace to society. So it was established at start that no man was to receive the money who could not use it advisedly and conservatively; also, that when a man seemed to qualify under the plan and later developed weaknesses that it was within the province of the company to take away his share of the profits until such time as he could rehabilitate himself."

To assure each operative just treatment under the new wage scheme, a large corps of specially trained investigators was employed to carry out the follow-up work upon which continuance in the profit sharing necessarily depended, and so successfully has the plan operated that, by the spring of 1916, about 90 per cent of the entire force were receiving their share of the profits. This naturally means that there has been a great improvement in the personnel of the organization. Thrifty habits have been developed; intemperance has largely ceased to be a considerable factor; domestic conditions have materially improved, while the increase in physical attributes is shown, not only in the reduction of the number of absentees but also in the productive achievements of the workers.

The concern that has most recently adopted a plan designed to afford employees a share in management is the Bethlehem Steel Corporation, and the idea is to be put in operation in all of the subsidiary companies, including several of the large shipbuilding corporations of this country. The principles of representation adopted by the company will, it is hoped, give all employees a voice in regard to the conditions under which they labor and provide an orderly and expeditious procedure for the prevention and adjustment of any future differences, as well as to anticipate the problem of continuous employment.

The plan provides that employee's representation shall be on the following basis: Plants employing under 1,500 persons, one representative for each 100 employees; where 1,500 to 10,000 persons are employed, one representative for each 200 employees; when plants employ more than 10,000 persons, one representative to each 300 employees. Representatives are elected for a term of one year and shall be deemed to have vacated office upon severing connections with the company. Any employee who has been on the payroll for not less than six months, who has reached his majority and is either an American citizen or has secured first papers is entitled for election as representative, while employment by the company for 60 days gives an operative the right to vote on questions of representation. The company appoints a management's representative whose duty it is to keep the management in touch with the representatives.

As in the Standard Oil plan, most of the detailed work of the organization is performed through various committees, which include: Rules; Ways and Means; Safety and Accident Prevention; Practice, Methods and Economy; Employees' Transportation; Wages, Piece Work, Bonus and Tonnage Schedules; Employment and Working Conditions; Health and Works Sanitation; Education and Publications; Pensions and Relief; Athletics and Recreation, and Continuous Employment and Condition of Industry.

The company by agreement guarantees that a representative shall be free to discharge his duties in an independent manner, without fear that his standing with the management will be affected by any action taken by him in his official capacity, and, to assure such independence of action, he is given permission to take a question of alleged discrimination against him on this account to any superior officer, to the president of the company, and, failing relief, to the State Department of Labor or to the secretary of labor of the United States.

Grievances which may occur in the future are to be handled by means of the machinery provided for this purpose. For example, where an employee is unable to adjust any matter with the foreman of the works where he is employed, it may be taken, either by the employee himself or, if he prefers, by his representative: (1) to the superintendent of the department; (2) with the management's representative, and (3) with one of the superior officers of the company, who will endeavor to effect a settlement, or who may, with the approval of all parties concerned, refer the question to the proper joint committee, consisting of the committee of employees' representatives with the addition of the same number of company's representatives, named by the management. If this method fails to effect adjustment within a reasonable time, the matter may be referred to the general joint committee on appeals, and if this settlement proves unsatisfactory, the president of the company shall be notified, and the question in dispute may thus be referred to an arbitrator, or arbitrators, to be determined by the nature of the controversy.

Another experiment in industrial peace through democracy in management was started in the Middle West in June 1914, and, as reported by the United States Department of Labor, the plan has proved so effective that all such questions as wage bargaining, hours of labor, discipline, discharges and adjustment of all grievances have now been put upon a collective basis.

Under this plan, all phases of management in which the employees are directly interested are handled through three separate bodies, known respectively as the senate, the cabinet and the house of representatives. The senate and cabinet represent the interests of the firm, while the members of the house of representatives are elected from among those employees of the company who have been in continuous service for at least six months, the election being by popular vote, in the ratio of one representative for every 15 employees, with the exception that a department having less than 15 operatives is given a representative.

Both the senate and the house of representatives have the power to initiate a proposition that is of interest to the employees, and may discuss and act upon all matters affecting their welfare. In case of disagreement in the actions of these two bodies, the matter is referred to a joint conference committee composed of an equal number of members from each body, and the results of their deliberations are finally submitted to the cabinet — composed of members of the executive board of the firm — for approval.

Much of the detailed business of the industrial congress is transacted by joint standing committees, including the betterment committee, which hears all complaints and adjusts grievances, the welfare committee, which deals with questions affecting the health and comfort of the workers, and the wage committee, the functions of which are: (1) To recommend and pass upon general changes in wages; (2) to suggest and pass upon minimum and maximum rates to be paid for the various operations according to skill involved, length of service and steadiness in attendance; (3) to sit with the planning board of the company for the purpose of passing upon individual increases in wages, and (4) to receive complaints of individuals to whom increases were denied. See ARBITRATION, INDUSTRIAL; PROFIT SHARING.

JOHN R. MEADER.

INDUSTRIAL RELATIONS COMMISSION. A commission created by act of Congress 23 Aug. 1912, for the purpose of inquiring into the general condition of labor in the principal industries of the United States, including agriculture, and especially in those industries which are carried on in corporate forms; into existing relations between employers and employees; into the effect of industrial conditions on public welfare and into the rights and powers of the community to deal therewith; into conditions of sanitation and safety of employees; into the growth of associations of employers and of wage earners; into the extent and result of methods of collective bargaining; into any methods which have been tried in any state or in foreign countries for maintaining mutually satisfactory relations between employees and employers; into the methods of mediation and conciliation; into the scope, methods and resources of existing bureaus of labor, and into possible ways of increasing their usefulness; into the question of smuggling or other illegal entry of Asiatics into the United States or its insular possessions, and of the methods by which such Asiatics are gaining admission, and to report to Congress recommendations for remedying existing difficulties. The commission consisted of nine members, including three employers of labor, three representatives of labor organizations and three representatives of the public at large. It separated its work into two large division: (1) public hearings; (2) research and investigations; and published valuable reports. Its final report was presented at the first session of the 64th Congress. It expired in August 1915.

INDUSTRIAL REPUBLIC. See INDUSTRIAL PEACE, EXPERIMENTS IN.

INDUSTRIAL REVOLUTION, The. Down to the middle of the 18th century few mechanical invention had been made and people were still using the appliances in use at the time of the Pharaohs. The people of western Europe continued to till their fields with crude implements, harvest their grain with a sickle and thresh it with a flail, weave their cloth on hand looms, and saw and plane their boards by hand as their forefathers had done for 3,000 years. Means of transportation and communication had shown similar stagnation. As an illustration of the backwardness of invention we may take the textile industry, which was carried on in every home. From the days of Penelope in the time of Homer down to 1760 only three improvements had been made in the method of making cloth, and only one of these introduced any considerable change. The first was in the process of fulling the cloth: instead of throwing it into a brook and having it trod into the mud by the bare feet of children it was now fulled by means of a water fuller run by water power. A second really significant change was made in tne 15th century. It was the substitution of the spinning wheel for the distaff and spindle; but while the spinner could spin much more rapidly, she was still unable to spin more than one thread at a time. The third change was the "fly-shuttle," invented by John Kay in 1738, by which the weaver could manipulate his loom more rapidly and easily.

Industrial Revolution in England. — Suddenly, however, a series of inventions was made in England, beginning about 1760, which completely revolutionized the existing methods of industry and introduced a new industrial era. Greater and more far-reaching mechanical changes occurred in the next few decades than in all the world's history before. Machinery was substituted for hand tools, the factory system supplanted the domestic system of home works, and industry gradually assumed the shape that is familiar to us. This series of changes is known as the Industrial Revolution, a name first applied by Arnold Toynbee about 1880, but which is now in general use.

Just why the Industrial Revolution should have occurred at the time when it did, or why it should have taken place in England rather than on the Continent, are difficult questions to

answer. Necessity seems to have preceded invention in this case as generally, for the need of improved mechanical appliances was keenly felt in England, France, Germany, Switzerland and other countries, and considerable progress had been made in the physical and chemical sciences. England took the lead in industry for several reasons. In the first place she possessed the most important raw materials either at home (wool, coal and iron) or in her colonies (sugar, iron, cotton, dye and other woods). All of these were of such a character that they could best be worked up in quantity; there was therefore a demand for machinery for this purpose in England. Her insular position and the consequent ease of waterway communication—which was the quickest and cheapest—gave her command of larger markets than any of the continental countries. The political situation in England was such as to ensure domestic tranquillity and the security of property rights, which were essential to the development of manufactures. In this connection might be mentioned also the breaking down of the restraints of the guild system and the development of a good system of patent law. Capital was already accumulating in England, much of it won from the colonies by trade, there was a sufficient supply of skilled labor, and under the domestic system there had grown up a class of middlemen or enterprisers who could conduct business on a large scale. The conditions were ripe in England for a rapid industrial development, and when a series of technical improvements was made after the middle of the 18th century, adjustments in organization quickly followed.

The first important inventions occurred in the textile industry. Under the domestic system, where the processes of spinning and weaving were both carried on by hand, a principal difficulty had been to provide enough yarn, as it required the work of from 5 to 10 spinners, each spinning a single thread, to keep one weaver occupied. In 1767 James Hargreaves invented a machine known as the jenny, which operated eight spindles instead of one; this number was later raised to 80. The following year Richard Arkwright patented a machine in which the threads passed through two sets of rollers, of which the second pair was driven at a higher speed and thus drew out the wool or cotton into thread. This roller machine was known as the water frame because it was operated by water power. It had, however, one drawback, in that it did not twist the fibre tightly enough to make fine thread. But this difficulty was met in 1779 by Samuel Crompton, who combined the best features of the two earlier machines into one, which because of its hybrid origin was named the "mule." As a result of these improvements in spinning machinery the traditional relations between the spinners and the weavers was reversed and more yarn could be produced than the hand looms could weave into cloth. In 1784 Dr. Edward Cartwright turned his attention to the construction of a power loom, which he succeeded in perfecting some three years later. Other improvements were made in the processes of printing and bleaching the cloth, but it remained for an American, Eli Whitney, to complete the series of improvements by his invention of the cotton gin in 1792. Whereas only a pound of cotton could be cleaned of its seeds in a day by hand, with the aid of the gin a man could clean 300. Unlimited cheap raw material was thus assured cotton manufacturers. The effects of these inventions upon the textile industry were revolutionary.

But in order that the new inventions might be made serviceable and machinery utilized to the utmost, it was necessary that it be driven by some non-human power. Indeed it cannot be too strongly emphasized that the vital feature in the Industrial Revolution lay in the substitution of power for human muscles. As long as man was confined to the use of hand tools his powers of production were strictly limited by the number of human hands available for this purpose, but as soon as machinery was invented and was driven by non-human power, there was no limit placed upon his powers of production through physical limitations. It depended now upon his ability to make the machines and to develop the power. Windmills were well known, but were unsatisfactory for this purpose, and at first water power was resorted to. But not until the steam engine was perfected did man have a really efficient instrument for this purpose. With this invention mankind entered upon an entirely new phase of development, and one that opens new vistas for the future.

The expansive power of steam was known to the ancient Greeks, but not until the 18th century was it put to practical use. In 1705 Newcomen constructed a practicable engine for pumping water out of the mines, and it was while repairing one of these crude affairs that James Watt in 1769 invented the improvements that made it a modern machine. It was now made adaptable for driving spinning machines, power looms and other mechanical devices. Its first use, however, was for pumping water, which had previously been a great menace, out of the coal mines, and hoisting the coal to the surface. This gave a great impetus to coal mining, which was further hastened by the invention of the safety lamp. The art of smelting iron by coal was made available about 1750, and in 1784 Corte discovered the process of "puddling." Other improvements were made in the blast, the substitution of rollers for the hammer, and in appliances for handling heavy castings. These changes reacted powerfully on the iron industry and the manufacture of machinery, as the new processes made iron stronger and at the same time more malleable and easily worked up. There was now no limit to the supply of strong and powerful machines, for which the demand seemed unceasing.

Results.—The effects of the Industrial Revolution were momentous and far-reaching, and resulted in a veritable social revolution. The most striking result was the great increase of productive power of a society equipped with these new appliances. Unfortunately, however, the benefits of this increase in output and wealth were very unequally distributed; the landlord and the capitalist class profited greatly, but the mass of the wage-earners gained little if any by the new inventions. Indeed for a while it seemed as if they suffered only loss, for the use of machinery permitted the use of the labor of women and children on a large scale and rendered valueless the painfully

acquired skill of the former hand workers. A second result was the destruction of the domestic system of production and the substitution therefor of the factory system. Under the former system industry had been carried on within the home by the domestic artisan, who generally owned his tools. Now, however, the new machines were much too expensive to be owned by a cottage workman, and it was moreover impossible to operate them in the home, as they were driven by power. It became necessary to bring both machines and workmen together in factories, where the building, the machinery and the materials were owned by the capitalist enterprisers. This brought about a sharp distinction between the two classes of workers involved, the capitalists on the one hand and the wage-workers on the other. Due to the need of capital in order to undertake manufacturing under the new conditions, the worker became more dependent upon the capitalist for employment. These facts brought to the front questions of labor and capital, which have become increasingly important as time has passed. See FACTORY SYSTEM.

Industrial Revolution in the United States. — The term Industrial Revolution has usually been applied to the sudden and remarkable series of changes that occurred in industry in England between 1760 and 1790, though it took another generation for them to work themselves out. The old domestic system of industry was completely transformed and a revolution wrought in the economic and social life of the people. It is interesting to raise the question whether other countries have experienced similar changes and whether we can apply the term to other periods than that just mentioned. The nearest approach to an industrial revolution in the United States probably occurred in the 30-year period beginning with 1808, when a series of political and industrial events led the people to develop manufacturing by the factory system in addition to agriculture and commerce. This did not lead to any revolutionary changes as in England, since there had never been any widespread development of the domestic system of manufactures before this time. The transfer from one system to the other was therefore accomplished without any painful readjustment or suffering. A similar industrial transformation from agricultural to manufacturing conditions occurred in France between about 1820 and 1850, and in Germany after 1870.

Conclusion. — It is unlikely that we shall again have such a sudden and complete revolution in industry as occurred in England at the end of the 18th century. And the reason is not because of the absence of change, but rather because change is a normal condition of modern industry. Manufacturers to-day expect new inventions and take into account the obsolescence of their machinery as naturally as they do its depreciation. Change is constant but just on that account it is less felt than was the Industrial Revolution, because there is constant adjustment. New inventions or changes in transportation or other factors may and often do completely revolutionize a business within a decade. but such changes are now regarded as a condition of progress. Being anticipated, they are met and bring no train of disasters such as made the English Industrial Revolution famous in history. See GREAT BRITAIN — INDUSTRIAL REVOLUTION; HISTORY, MODERN.

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INDUSTRIAL SCHOOLS, an English term variously applied; sometimes synonymous with the so-called Ragged Schools, in which mechanical arts are taught; sometimes designating ordinary elementary schools in which agriculture, domestic science or some other industrial art is taught during a portion of the school day. The term is becoming obsolete, having fallen into disfavor because of its application to reformatories.

INDUSTRIAL SERVICE. See INDUSTRIES, WELFARE WORK IN.

INDUSTRIAL TERMS. The following list embraces many of the important terms that are used technically in the several commercial industries. Such terms as are usually regarded as self-explanatory, as well as those that have no general application, have been omitted. Those that are of more than ordinary importance will be found defined more fully under their appropriate heading.

ABB.— In wool-sorting the quality of the wool is denoted by the terms: "fine abb," and "coarse abb."

ACIERAGE.— In engraving, the deposition of a very thin layer of steel on the face of an engraved copper plate, to increase its durability under the stress of printing.

ANNEALING.— The process of treating substances by heat to remove their brittleness and yet make them tough and inclined to be elastic.

ANTHICHLOR.— A term used in bleaching to denote the method employed to remove or neutralize the injurious effects of the free chlorine left in some bleached materials.

ARCH.— When a portion of a lode is left standing, in mining, because it is too poor to work or is needed as a support, it is called an "arch."

ASHLARING.— In carpentry, the placing of upright studs to form vertical walls of a room constructed under the slopes of a peaked roof.

ASTERISM.—A term in printing denoting the three asterisks sometimes placed before a sentence to call attention to it.

ATTEMPERATION.— Regulating the temperature of the beer-worts in brewing.

ATTENUATION.— The decrease in density of the beer-worts in brewing is termed "attenuation."

AUTOGENOUS SOLDERING.— Joining pieces of the same metal by fusing them together by a melting heat applied at the juncture.

AVIVAGE.— A process for clearing and brightening the colors in dyeing.

BACK.— (a) In metal-mining, the portion of the lode that lies between the level and the one next above it; (b) in coal-mining, the inner end of a heading where work is being conducted; (c) the thickest and best hides are termed "backs" in the leather trade.

BACK-CASING.— A wall of dry brick sunken through sand or gravel in mining.

BACKLASH.— In coal-mining, the backward suction after an explosion of firedamp.

BACK-STAY.— In printing, the leather strap used to check the carriage of the press; in lathes, a support to prevent the work from springing away from the cutting tool.

BALK.— When a bed of coal suddenly thins out it is termed a "balk."

BALLOONING.— In spinning, the bellying outward of the thread while it is being wound on the bobbin.

BAND.— A layer of rock that is interstratified with coal.
BARNEY.— A small car used in mining to push the mine-car up a slope; the pit from which it runs is termed the "barney-pit."
BARREL-WORK.— Pieces of native copper too small to be handled as mass-copper, but large enough to be shipped in barrels.
BASTARD.— (a) An impure brown sugar made from the refuse of previous boilings; (b) the large mold into which the sugar is drained is also called a "bastard;" (c) in printing, any type whose face is out of proportion to the size of its body is termed "bastard" type.
BASTARD FLATTING.— In painting, the "egg-shell" semi-gloss surface produced by using three times as much turpentine as oil in the paint mixing.
BATING.— The process of steeping hides and skins to render them soft and fit for tanning.
BATTERY.— The timber structure that is used to prevent coal from sliding down a shute.
BAY.— In mining, an open space for waste in a long-wall working.
BEAMING.— (a) Winding the warp-yarn on a loom in the manufacture of cloth; (b) working hides with a slicker over a beam in the leather trade.
BEATER.— (a) A machine used in cotton manufacturing to open and clean the cotton before it passes to the carder; (b) a knife used for breaking flax or hemp; (c) the batten of the loom used for weaving.
BEAUMONTAGE.— The filling material used to stop small holes in wood or metal work; in the first instance made of varnish thickened with chalk and resin, in the case of iron, with a mixture of iron filings and sal ammoniac.
BENCHING.— A term applied to the process used in getting the coal after it is holed.
BLACK-LIQUOR.— A crude acetate of iron used, in dyeing, as a mordant.
BLEED.— (a) In bookbinding, to trim the margin too closely; (b) in dyeing, extracting the coloring matter.
BLEU-DE-ROI.— The term used to denote the cobalt-blue color in European porcelain.
BLICK.— The iridescence appearing on gold and silver at the end of the refining process.
BLOOMING.— Clouding of a varnished surface usually through the absorption of moisture.
BLUE-CAP.— In mining, the bluish or brownish halo which, when it appears around the flame of the safety lamp, indicates a dangerous quantity of fire-damp, is termed the "blue-cap."
BOARDS.— The hard paper-stock inserted between the printed sheets in a press to remove an indentation of impression; often called "press-boards."
BONE.— The term used to define the slaty portions in a coal mine.
BONNET.— The shield used to protect a mine shaft from substance which might otherwise fall into it.
BORDER.— The rim fixed about the bed-plate used in milling to prevent the meal from falling off before it reaches the proper opening.
BOSSING.— The working of lead sheets into hollow forms by pressure, without cutting and soldering.
BOX CALF.— Chrome-tanned calf-skins, which bear square markings due to rolling the skins lengthwise and from side to side while still damp.
BOXING IN.— In printing, the enclosing of special reading matter with a frame of rule.
BRANNING.— A term that is applied both to the process of steeping cloth before or after it is dyed, and to the steeping of skins before tanning.
BROOD.— The term applied in mining to all heterogeneous mixtures found with copper or tin ore.
BRUSH.— An instrument constructed of several small trees, like the birch, and used by farmers instead of a harrow in covering grain, or small seed after sowing.
BUCK.— The breaking of ore into small pieces for jigging.
BUDDLE.— In mining, to wash ore free from earthy matter the water is run over an inclined hutch which is termed a "buddle."
BULLING-BAR.— In mining, the bar used to ram clay fillings into open cracks before blasting.
BULLY-HEAD.—The name by which the sledge-hammer used by miners is popularly known.
BULTOW.— In the fishing industry, the practice of stringing many hooks on one line, used in fishing for cod off the Banks.
BUNCHY.— Used in mining to denote that the ore is irregularly distributed through the lode in small masses, or "pockets."
BUNDLE.— (a) In paper-making, 2 reams of printing, or brown paper; (b) in spinning, 20 hanks, or 6,000 yards of linen yarn.
BUNTONS.— The timbers put across a mining shaft to divide it into compartments.
BUTT.— A hide of sole leather in which the belly and shoulders have been cut off.
CADE.— A term of measurement in the fishing trade, denoting either 500 herrings, or 1,000 sprats.
CAGE-SEAT.— The framework at the bottom of a shaft, so arranged as to reduce the jar when the cage drops upon it.
CALF.— A term applied to a bookbinding in calf-skin. This binding is of several grades: Divinity calf, a dark-brown binding, with blind stamping and no gilding; half-calf, in which the backs and corners only are of calf-skin; mottled calf, a calf binding of pale color in which the decorations have been made by the sprinkling of acid; smooth calf, or plain, undecorative leather; tree calf, a bright, brown calf binding stained by acid to imitate the trunk and branches of a tree.
CAMBER.— In building, the amount of curvature upward given a horizontal beam; for cast iron ¼ inch for each 10 feet of span; for steel, ½ inch for the same span.
CANCELS.— In printing, the pages of a book which have been reprinted because of error in copy or type. They are marked usually by an asterisk in the bottom margin of the page.
CANCH.— A term used to denote that part of a floor or roof of a gangway that is removed to equalize the grade because of a fault, or break in the strata.
CANT BRICK.— A brick cut at any angle other than a right angle.
CANNEL.— A form of weaving that produces a corded or rep tissue.
CAP.— A term denoting certain sizes and shapes in paper: Double cap, 17 x 28 inches; exchange cap, a fine quality paper, used in printing bills of exchange; flat cap, or full cap, 14 x 17 inches; foolscap, usually 12 x 15 inches; legal, or pot cap, 13 x 16 inches, etc.
CARCASE.— In building, the rough structure of a building (or a ship) before finishing work is begun.
CARDING.— The disentangling of wool, cotton or other fibres with a card, preparatory to spinning. See COMBING.
CARRIAGE.— In building, the inclined timber structure which supports the staircase.
CARROT.— In the fur trade, to dress a pelt to preserve it from insects.
CARROTS.— Rolls of tobacco after they have been so prepared that they require only to be ground and sifted to be made into snuff.
CASE.— (a) A shallow wooden tray, the partitions making the small boxes in which the various characters of type required by printers are kept in order for the use of compositors. (b) A book cover that has been made separately from the book for which it is intended.
CASE-HARDENING.— Producing a thin surface layer of steel upon soft iron articles by heating them to cherry-redness in contact with charcoal or other carbon.
CASSE-PAPER.— The wrinkled, broken, or otherwise imperfect paper rejected by the trade.
CASSETTE.— The utensil in which chinaware is baked; sometimes called the "coffin."
CAST.— (a) The water used in the preparation of beer. The quantity that is first placed in the mash-tub is termed the "first cast;" that which is subsequently added, the "second cast," "third cast," etc. (b) In bee culture, an after swarm led by a maiden queen.
CATCHWORD.— In printing, the setting of the first word of the following page at the lower right-hand corner of the page form — found only in old books.
CATGUT.— Strips cut from the specially treated intestines of sheep and horses.
CERTOSINA WORK.— A term used to denote the inlay of certain light materials — like ivory or satinwood — upon dark woods like walnut.
CHASE.— In printing, a square, open framework of iron into which the type forms are fastened to facilitate moving and working on the press.
CHASE MORTISE.— In building, a mortise with one side on a bevel to allow the easier entrance of the tenon.
CHEMICAL PULP.— Wood pulp in which the fibres have been separated by chemical process instead of by mechanical means.
CHILLED CASTINGS.— Iron castings with hardened surface produced by casting in metal molds which conduct away quickly the heat of the molten iron.
CHOP.— (a) In milling the product of the first crushing of the wheat; (b) also used to denote the brand and quality of tea imported from China, as "first chop," etc.
CHROME LEATHER.— Leather tanned with chromium salts instead of vegetable tanning agents.
CISSING.— In painting, the appearance of small dull spots in a varnished surface due to underlying oil or grease.
CLEARCOLE.— A coating of glue size and chalk laid upon plaster walls before painting them.
CLICKER.— The workman who cuts the uppers and soles for boots and shoes.
CLOG.— The short pieces of timber used in mines to prop the roof.
CLOSING-MACHINE.— (a) A machine that sews heavy cloth or leather with a lockstitch, alike on both sides; (b) apparatus used in rope-making to twist the already made strands into rope.
COBBING.— In mining, a process of breaking the ore that the better parts may be sorted out.
COCKLE.— (a) A large stove used in the making of porcelain, to dry the biscuit-ware after its glazing preparatory to burning; (b) the kiln used for drying hops.

COLD BEND.— In iron specifications, the angle at which iron bars or plates break when bent cold.

COLOR.— (a) In gold mining, the particles of gold that are shown when auriferous sand is washed out; (b) in printing, the evenness of distribution of ink in an impression.

COMBING.— In spinning, the removal of short fibres from the carded textile before it is spun.

COMMERCIAL.— A term used to denote the shape and size of paper: Commercial letter, 11 x 17 inches; unfolded commercial letter, small, 10½ x 16½ inches; commercial note, 8 x 10 inches, unfolded.

COMPANIONSHIP.— In printing, a number of compositors employed in setting up a quantity of copy under the direction of one leader.

COMPOST.— A mixture of various manuring substances used by agriculturists in fertilizing land.

CONCENTRATOR.— A machine used, chiefly in mining in the United States, to separate the ore from the rock with which it was associated in the lode.

CONDITIONING.— In spinning, the dampening of cotton fibre to restore its natural percentage of moisture before spinning.

COP.— The cylindrical form in which cotton yarn is built up when spun on the mule. There are three sizes: Pin cop, bastard cop and twist cop. Woolen cop is of conical form.

CORD.— (a) In fancy weaving, the interval between two vertical lines of the design is termed a " cord; " (b) the same term is used in bookbinding when a book is tied firmly between two boards to assure its drying smoothly. The term " Maitland cord " is used in weaving to denote the cord which extends along the wooden shafts of leaves to which the heddles are secured.

CORDING.— The term denoting the arrangement of the treadles in a loom by which they are made to move in such clusters and time as the production of the pattern may necessitate.

CORE-PIECE.— The yarn running through the centre of a rope to assure its solidity.

CORNER.— The triangular tool used in bookbinding to decorate the corners of a book.

COUCH.— (a) The operation, in brewing, of spreading the steeped grain upon the floor to convert it into malt; (b) in paper-making, the act of removing the paper from the mold upon which it has been formed that it may be placed upon the felt.

COUCH ROLL.— In paper making, a felt-covered roll which squeezes out the surplus water from the sheet of wet pulp as it leaves the wire.

COUNTER-LODE.— A term used in mining to denote a lode running in such a direction in relation to the main lodes that it crosses or intersects them.

COUNTS.— In spinning, the relative diameter of threads, as measured by the weight of a stated length. Single thread counts in cotton are the number of hanks of 840 yards in 1 pound: That is, a 20-cotton thread is 20 hanks to the pound. In worsted, the basis is 560 hanks to the pound. In wool, it is the number of one-yard skeins in 1 dram.

COURSING.— The method of regulating the ventilation of a mine by conducting the air through various doors, stopings, etc.

CRABBING.— In woolen manufacture, a treatment of the cloth with live steam through a perforated roll; the object being to prevent subsequent wrinkling.

CRADLE.— (a) A movable hanging scaffold used by painters and builders, supported from above, and operated by ropes and pulleys; (b) in mining, a rocking tray for washing out placer gold.

CRAM.— In weaving, a warp that has more than two threads in each split of the reed.

CRAWLING.— In painting, the wrinkling of varnish, due to too heavy a coat or a sudden rise in temperature while the varnish is drying.

CRAZING.— In the pottery industry, when the glaze separates from the body and forms blisters.

CREASER.— A tool used in bookbinding to define the width of the bands of a book, and to fix the position of the lines on the backs and sides.

CREASING.— A course of tiles projecting on each side of a wall at the top, to prevent the soaking in of water falling upon it.

CREEP.— If the pillars of a mine are not sufficiently large, or the roof is not fully supported the pressure of the superincumbent strata sometimes causes a bulging or rising of the under-clay. Colleries have been entirely destroyed by " creep."

CREEPING.— The movement backward of a rubber tire when it is too loose on the rim.

CRIZZLING.— In glass manufacture, a blemish of the surface due to using cold tools upon it while in the plastic state.

CROP.— An untrimmed hide, struck for sole-leather, is termed a " crop," or " crop-hide " in the trade.

CROPPED.— In binding signifies that the margins of the pages have been trimmed too close.

CROPPING.— In cloth making, a machine process for shearing the nap of cloth.

CRUP BUTT.— In leather work, the oily part of a horsehide which covers the loin of animal, used especially for the uppers of hunting and fishing boots.

CRUTCH OR CRUTCHER.— A term used in soap-making to denote the perforated instrument with which the various ingredients are kept mixed while cooling.

CULLET.— In glass manufacture, clean waste and broken glass from previous meltings and castings added to a raw batch to initiate the fusion.

CURE.— In leather making, the substance used to prevent decomposition in raw hides and skins. The commonest cures are salt, arsenic, boracic acid and some of the coal-tar carbolic products.

CUT.— The block upon which a picture is engraved and from which it is impressed in printing.

CUTTER.— Usually applied, in mining, to a joint or crack which crosses a better defined system of cracks in the same rock.

DABBER.— The use of the " dabber " by printers has largely ceased since the introduction of the ink roller, but the same term is now applied to instruments used by etchers and stereotypers. The former is used to ink the surface of engraved blocks or plates; the latter to dab the back of the damp paper used in the papier-mache process of stereotyping, in order that it may be driven into the interstices of the type.

DABBING.— The term applied to the process in stone-working by which the surface of the stone is covered with small indentations, after having been made uniform.

DAM.— The term applied to the underground wall frequently constructed to hold back water, air or gas.

DAMPING.— A process used in bleaching to add a certain amount of moisture to a fabric, after it has been starched, that it may be properly finished.

DANDY.— The running-out fire for the melting of pig-iron in tin-plate manufacturing.

DANDY-ROLL.— The wire-gauze cylinder beneath which the web of water-pulp is passed in paper-making to drain it partially of water and impress the watermark.

DASH-POT.— A controlling device for checking sudden movements in mechanisms, consisting of a cylinder filled with oil or water in which moves a loosely fitted piston.

DASH-WHEEL.— The partially submerged wheel used in cotton manufacturing to wash and rinse calico in the piece.

DEAD GROUND.— In mining, those parts of the vein which do not contain ore.

DEAD MELTING.— In foundry practice, heating metal to a temperature considerably higher than its melting point.

DECK.— Used in mining to denote the loading or unloading of cars upon the cage.

DECKLE-STRAP.— The contrivance used in paper-making to define the width of the sheet by regulating the flow of pulp.

DELE.— A term used in proofreading to direct the compositor or printer to remove a letter, word or phrase.

DEMY.— A standard size in paper sheets. Printing demy is 22½ x 17½ inches; writing demy, 20 x 15½ inches; drawing demy, 22 x 17 inches.

DENTELLE.— In bookbinding, a style of finishing with delicate lace-like tracery in gilt.

DEPTH OF FOCUS.— The capacity of a lens (q. v.) to focus on one plane images of objects located at widely differing distances from the lens. This capacity is enhanced by the use of smaller stops.

DERBY FLOAT.— In plastering, a tool for smoothing freshly laid plaster. It consists of a longish board with a peg handle near each end. See FLOAT.

DEVIL.— (a) An errand-boy employed in a printing-office; (b) a plumber's fire-pot for heating solder and lead.

DIP CRANK.— A crank formed by bending a rod to crank form instead of building it up from separate pieces, or cutting it from a forging.

DIPPING.— A process in ceramics by which a coarse clay body is coated with fine enamel by being plunged into the liquid which constitutes the coating.

DISCHARGE.— In dyeing, the process by which white patterns are produced on colored grounds by a chemical bleaching or release of the color.

DISCOVERY CLAIM.— In mining law, the portion of ground held by reason of the first discovery of its mineral deposits.

DISHED.— The form given to wheels or discs where the centre is in a hollow as compared with the plane of the rim.

DISTRIBUTE.— A term used in printing for the process of returning dead matter (type no longer required) to the cases; " thrown-in " is another term used to define this process.

DOCTOR.— (a) A term in wine-making, used to indicate that the character of the wine has been changed by the addition of another liquor; (b) to alter any commodity for purpose of deception.

DOFF.— A term that has several distinctions in the textile manufacture: (a) The process of stripping the cotton or wool from the cards preparatory to spinning; (b) the act of mending broken threads; (c) the removal of full bobbins to give place to the empty ones.

DOLLY.— (a) A soft polishing mop rotated at high speed for putting the final surface on metal work to be plated; (b) in mining, a heavy tool, sometimes of wood for crushing soft materials.

DONGOLA.— As applied to leathers, skins which have been tanned by both the vegetable and mineral tanning agents successively.

DOSSIL.— The roll of cloth used to clean the ink from an engraved plate prior to printing.

DOUBLE.— A term used to denote the size and quality of paper: Double medium, a printing paper, 24 x 38 in.; double royal, a printing paper, 26 x 40 in.; double demy, 35 x 22½ in.; double imperial, 44 x 30 in.

DOUBLE-DYEING.— A method of dyeing mixed goods by which the wool and cotton are dyed separately with colors that have no affinity for the other fibre.

DOUBLE-MILLED.— A term applied to denote that cloth has been fulled twice to make it finer in quality.

DOUBLER.— (a) A machine for doubling and drawing silk; (b) a still made to intercept and redistil the vapors of distillation; (c) a felting placed between the fabric and the press before printing.

DOWNCAST.— A term used to denote the system of ventilation used in mining, the shaft down which the air passes into the mine being called the "down-cast."

DRAFT.— In weaving, a chart or plan showing the cording of a loom or the arrangement of the heddles.

DRAG.— (a) A light iron-rod tool with a tapering spiral end, used by miners in cleaning out bore-holes before introducing the blasting charge; (b) the device that guides wood to the saw in saw-milling; (c) also applied in printing to denote the thickened impression on one side of the letters produced by the scraping of the sheet on the type.

DRAW.— In cotton spinning, the extent of the outward and inward run of a mule carriage, usually 63 or 64 inches. The speed of the mule is designated by the number of draws per minute.

DRAWING-PAPER.— A term used commercially to describe a variety of stout papers manufactured expressly for use in drawing. The regular sizes are as follows: Cap, 13 x 16 in.; demy, 15½ x 18½ in.; medium, 18 x 22 in.; royal, 19 x 24 in.; superroyal, 19 x 27 in.; imperial, 21½ x 29 in.; elephant, 22½ x 27½ in.; columbier, 23 x 33½ in.; atlas, 26 x 33 in.; theorem, 28 x 34 in.; double elephant, 26 x 40 in.; antiquarian, 31 x 52 in.; emperor, 40 x 60 in., Uncle Sam, 48 x 120 in.

DRAWING ROLLS.— Rolls used in spinning machinery set in successive pairs, each of which turns more rapidly than any previous pair, the sliver (q.v.) passing through them in succession.

DRAW-BOY.— Formerly the weaver's assistant; now, a mechanical device used in drawing the heddles to form the pattern of the cloth to be woven. The machine upon which this figure-weaving is done is known as the "draw loom."

DRAWN.— A term denoting the method of freeing substances from all particles of iron and steel by use of a magnet.

DRESSER.— (a) The workman employed in type-foundries to remove all defects from the types in preparing them for sale; (b) the tool, or machine employed to cut and dress the furrows on a millstone; (c) a mallet used by plumbers for flattening sheet-lead; (d) one of the picks used in mining.

DRIFT.— A term used in mining to describe the nearly horizontal passage ways frequently excavated in working a mine; sometimes called a "drive."

DRILL.— (a) In agriculture, when a field is not sown broadcast, but in rows, it is said to be in "drills"; (b) also the machine for sewing in this way.

DRIFT-JOINT.— When two sheets of metal used in roofing have been joined without soldering by a step-down, so that the joint forms a water-conductor the arrangement is known as a "drip-joint."

DROP-BAR.— A term applied to the bar or roller on a printing-press that regulates the passage of the paper sheets to impression.

DROP-FINGER.— In some cylinder printing-presses the rods that are employed to hold the sheets in place until they can be seized by the grippers are termed the "drop-fingers."

DROPPER.— A term used in mining to denote a branch or spur that connects with the main lode but does not materially enrich it.

DROPPING.— A term used to denote a defect in the product of the glassmaker. It is caused by the accidental dropping of crude glass or furnace lining into the molten glass in the melting vessel.

DROP-ROLLER.— Used in printing to denote the roller that drops at specified intervals to supply the printing ink for distribution on the ink table.

DROVING AND STRIPING.— A process in stone-cutting by which the shallow parallel grooves are made along the length of the rough-hewn stone.

DRUNKEN SAW.—A "wobbling" circular saw, set off at right angle on its arbor, used for cutting a groove in timber, the width of the groove being governed by the aberrance from a right angle.

DRYING-OFF.— A term denoting the process by which an amalgam of gold is evaporated.

DRYING-PLATES.— Used in brewing to denote the series of frames in the malt kiln. They are placed one over the other, and, being covered with woven wire, the hot air ascends through them in such manner as to dry the malt.

DUMMY.— In plumbing, a wooden rod having a lump of lead at the end, used for ramming out dents in lead pipe.

DUMP.— Used in printing to denote the act of removing types from the stick to place them on a galley.

DUNG-BATH.— In some processes of dyeing and calico-printing the cloth is subjected to a "dung-bath," composed of warm water, animal's dung, etc., for the purpose of removing the superfluous mordant.

EASING.— In weaving gauze, the motion by which the tension of the warp is slackened during the formation of the cross-sheds.

EGG-SHELL.— A term used commercially to denote the thinnest and most translucent of china or porcelain.

EGG-SHELL FINISH.— See BASTARD FLATTING.

ELBOW-PLATE.— In paper-making, the cutter of the rag-cutting machine when bent to an angle in the middle.

ELECTROPLATING.— The process of coating articles with silver or other metal by means of electrolysis.

ELECTROTYPING.— The process of making plate copies of any engraved or molded surface by means of electrical deposition.

ENSILAGE.— An agricultural term used to denote the process of preserving fodder, etc., in a green state by storing the materials under pressure in silos or in pits dug in the ground.

ENTASIS.— The slight convexity in the upright outline of a pillar or column; more pronounced in Roman architecture than in Greek types.

FACE.— In coal-mining, the working, or portion of the seam that is being mined.

FASCET.— A rod, or basket of wire used in carrying the bottle from the mold to the leer in glass-manufacture.

FAT-COLOR.— Paint which has been long mixed and has become thickened and greasy.

FAT LIQUOR.— In leather manufacture, an emulsion of fish or other oils with soap, and, usually yolks of eggs, used as a dressing for skins.

FAT-WORK.— In printing, when copy is particularly profitable to the compositor owing to the fact that it has much open space that may be filled with quads, or that in other ways favors rapid execution, is termed fat-work. To beat, or ink "fat" in printing means that a form of type has been given an excess of ink.

FEEDING.— In printing, a term denoting the method of placing the sheets of paper in such position that they are ready to meet the requirements of the press.

FEINTS.— The first products of distillation which come over from a pot-still when making whisky.

FETTLING.— The operation of removing fins, etc., from castings.

FIGGING.— In soap making, a spotty appearance of the soap due to undissolved specks of potasium stearate; considered a mark of excellence. It is simulated by the addition to common soaps of flecks of clay or talc.

FILATURE.— In silk-culture, a reel by which the silk is drawn from the cocoons. Also used as to the quality of the raw silk marketed on these reels.

FILLET.— (a) In weaving, a strip of card-clothing; (b) in dairying, a perforated curb used to confine the cheese-curds; (c) a wheel-shaped tool used in bookbinding to impress a gilt line, or decoration upon the covers of books; (d) in printing, a rule fixed with lines that may be used as a border.

FILLING.— (a) The term by which the woof or weft thread of a woven fabric is known; (b) in soap making, the treatment through which the soap is made to carry an excess of water or other adulterant.

FILLING CAN.— In rope-making, the can in which the sliver is condensed and wound after coming from the doublers.

FINE-DRAWING.— The term applied to the finishing process in cloth manufacture. By exposing the cloth to a strong light all the minute holes due to breaks are discovered so that they may be repaired with a needle, by the introduction of sound yarns in the place of those that have proved defective.

FINING-ROLLER.— A cylindrical sieve of wire cloth used in paper-making to retain the coarse fibres and knots so that they cannot pass through with the finely ground stuff.

FIRE-GILDING.— A process of gilding by the application of an amalgam from which the mercury is afterward driven by the heat of a muffle, leaving a fine film of gold.

FIXING BATH.— (a) In tanning, the catechu-bath is followed by another known as the "fixing" bath. It consists of water sufficient to cover the skins, acidified with nitric acid, modified with a little glycerine; (b) in photography the chemical bath used to dissolve from an exposed plate the silver salts not changed by the action of light.

FLASHING.— (a) A strip of sheet lead, zinc, or copper used to make a watertight joint between a roof and the chimney passing through it, or in the valleys formed by angular intersections in a roof; (b) in glass manufacture, the laying upon glass of a thin coating of glass of another color.

FLATTING.— In painting, the laying of a coat of paint with a dead surface.

FLESHER.— The tool used in leather manufacture for the purpose of fleshing hides, that is, removing adhering flesh or fat.

FLIGHT.— The series of steps between a floor and a landing.

FLITCH.— The piece of wood or metal added to a beam to strengthen it. The beam is thence termed a flitched beam.

FLOAT.— (a) The flat metal tool used by masons for smoothing the surface of fresh plaster; (b) in weaving, the passage of the shuttle crosswise above or below the threads but without intersecting them.

FLONG.— The combination of moist tissue paper and paste used in stereotyping by the papier-mache process to form the mold or matrix from composed types or engraved surfaces.

FLOOR.— In brewing, each steeping is known as a "floor" or "piece."

FLOORING.— Used in brewing to denote the operation of spreading the grain on the malt-floor, that it may be kept at an even temperature, to check germination.

FLOW.— A term used in ceramics to denote the flux that is used to make the colors run and blend in firing.

FLUE WORK.— In pipe organs, those "stops" which produce their tones by the vibration of air columns, and not by reeds. They include the "principal," "flute," and "stopped" groups.

FLUFFING.— In leather manufacture, the process of smoothing a leather surface on an emery wheel.

FLURRY.— A term used in calico printing to denote the condition of frothiness which is sometimes developed by the colors during the process of printing.

FLY.— (a) One of the arms of a spinning-frame which revolves around the bobbin to twist the yarn as it is wound upon it; (b) in cotton and wool spinning, the term applied to the fibre collecting on the carding rolls; (c) in weaving, a shuttle with wheels driven through the shed by a jerk; (d) in printing, the mechanism which receives and delivers the separate sheets as they are printed on the press; (e) in piano-making, the hinged board with which the keys are covered when not in use; (f) in clocks, the fan which controls the speed of the striking train.

FLY-NUT.— A nut with wings by which it may be turned with the fingers.

FOLIO.— While the word "folio" is used to denote the size of a book it is also applied as a descriptive term for several sizes of paper, each of which is designated by a specific name: Pot folio, 7½ x 12½ in.; foolscap folio, about 8 x 12½in.; flat-cap folio, 8½ x 14 in.; crown or post folio, 9½ x 15 in.; demy folio, 10½ x 16 in.; medium folio, 12 x 19 in.; royal folio, 12½ x 20 in.; superroyal folio, 14 x 22 in.; imperial folio, 16 x 22 in.; elephant folio, 14 x 23 in.; atlas folio, 16½ x 26 in.; columbier folio, 17½ x 24 in.; double elephant folio, 20 x 27 in.; antiquarian folio, 26½ x 31 in.

FOOLSCAP.— A term applied to a writing paper varying in size from 12 x 15 to 12½ x 16 inches. The term was derived from the water-mark, a fool's cap, which formerly appeared upon all the papers that bore this name.

FOOTLINE.— A term used in printing to denote the last line of a page of type. It is usually left blank, although it sometimes contains the number of the page or the signature on the sheets.

FOOTS.— The impure residues left after the refining of oils, fats, waxes, and greases.

FORMAT.— In printing, the plan of the page form of a book; as folio, octavo, etc.

FORWARDER.— A term used in bookbinding to designate the workman whose duty it is to receive the sewed book, put on its back, cover, etc., and prepare it for the finisher.

FRIZING.— In leather manufacture, the removing of a very thin layer from the grain (hair) surface of a skin.

FULL-FACED.— A term used in printing to describe a type with the thick lines that make it print extremely black.

FURNITURE.— The term "furniture" in printing denotes the pieces of wood or metal that are placed around the pages of type, not only to keep them the necessary distance apart but to assist in fastening them securely in the chases. When the furniture has been systematically cut into various standard lengths and widths, so that they may be easily combined, the pieces are known as "labor-saving furniture."

FUSTAIN.— The term applied to a short twilled cotton fabric, usually a cloth having a short pile, like corduroy, velveteen, etc.

GAGING-THREAD.— In weaving, a thread introduced temporarily to stop the weft-thread at a specified point.

GALLEY.— An oblong, shallow tray, now usually made of brass, but sometimes of wood, used in printing by compositors as a place to deposit the type they have set. Galleys in which the type may be locked are known as proof-galleys. Standing galleys are inclined frames fitted with cleats on which the type galleys rest. A proof taken from types being held on galleys is termed a "galley-proof."

GASSING.— In textile manufacture, the process of singeing off loose fibres and fluff from thread by passing it through a gas flame.

GATHERING.— (a) In glass-making, the method of coiling the molten glass on the end of an iron tube preparatory to the work of blowing; (b) in book-binding, the collecting of the printed and folded sheets in their proper consecutive order.

GIGGERING.— A process in bookbinding by which the burnished lines are laid by a sliding or rubbing movement, upon covers decorated in antique fashion.

GIGGING.— The process of finishing cloth by drawing the loose ends of wool in a fabric to the surface to form a nap. After the work of napping is completed the fabric is ready to be finished by shearing.

GILLING.— A term denoting a process for making all fibres level and even in the manufacture of woolen yarns or worsted.

GINGERBREAD-WORK.— A phrase used, somewhat as a term of contempt, in describing the fanciful shapes of the ornate wood-work and carvings seen in the ornamentation of houses, furniture, etc.

GLAIR.— In book-binding, a foundation applied where gilding is to be laid, made of whipped white of egg and a very little vinegar.

GLANCE.— A term used in mining to designate those ores in which a peculiar lustre and color indicates that they are of metalliferous combination.

GLORY HOLE.— A small furnance used to reheat glass in process of manufacture.

GLOSSING.— A term denoting the operation of twisting the hanks of silk, in silk-manufacture, after they have been dyed and dried. This process is sometimes termed "stringing."

GLYPTOGRAPH.— An engraving or carving on a precious stone.

GOODS.— The raw oils, fats and greases employed in soap making.

GOTHIC.— A term used by American printers to describe a style of square-cut printing-type very similar in appearance to the old Roman mural letter. In England this title is given to a boldface antique type.

GRAINING.— In leather manufactures, the impressing of skins with a fictitious grain or surface, to imitate more valued leathers.

GRAIN TIN.— Tin of the finest quality produced in this form by striking it a sudden blow when it is heated to near its melting point. Being brittle at this temperature, pure tin falls into a mass of grains.

GRATING.— In spectroscopy, a surface ruled with very fine lines, 5,000 to 40,000 to the inch; if on glass, it is called a Transmission Grating; if on metal, a Reflection Grating.

GRAVEL.— Used in brewing to denote the appearance of the beer when yeast-cells are floating about in it in the form of fine "gravel."

GRAY PIG.— Pig iron which shows a dark gray crystalline fracture, due to its content of graphitic carbon; as distinguished from white pig, which is a definite carbide of iron.

GRAY SOUR.— In cotton bleaching the dilute hydrochloric acid bath, employed to dissolve out the lime soaps formed in the lime boiling.

GRIZZLE.— A brick which has been slack-burned but is hard enough to hold its shape.

GRIZZLIES.— An arrangment in the mine sluice to receive and cast aside all the large stones brought down by the current during the process of washing the auriferous gravel.

GUARDS.— In book-binding, the narrow strips of paper bound in with the leaves at the back of the book to allow for pasting in material, as in a scrap-book.

GULLET.— The hollows between the teeth of a circular saw The filing out of these hollows as the teeth wear down is called gulleting.

HACKLING.— In flax-manufacture "hackling" is the process of preparing the flax for spinning by the removal of all foreign substances and smoothing and equalizing all the lengths of fibre.

HALF-BOUND.— A style of binding for books in which the backs and corners are of leather; as half-calf, half-morocco.

HALF PLATE.— In photography a standard size of glass plate, measuring 4¼ by 6½ inches.

HALF-TONE.— A term used to designate a photographic process in which a screen made either of netting or ruled glass, is interposed between the lens and the sensitized plate, and from the image thus produced, a positive image is made upon the prepared metal plate. This is etched into relief by the use of acids.

HALL-MARK.— A term used industrially to designate any official stamp that has been placed upon an object of trade to denote genuineness.

HARD-CURED.— A term used in the fishing industry to designate that the fish specified has been cured by being thoroughly dried in the sun after salting, a process by which all the moisture has been evaporated.

HARDENING.— A process used in hat manufacturing, by which the bodies of the hats are rubbed and pressed hard for the purpose of felting the material as well as to diminish the size and render them more dense. A hardening-kiln is a kiln in which the transfer printing process in pottery is completed: The pottery being relieved from all superfluous oils by exposure to a low heat.

HARNESS.— The term applied to the apparatus in a loom by the operation of which the warp-threads are shifted alternately to form the shed.

HESSIAN.— A coarse cloth made of a combination of hemp and jute and used for bagging is known as "Hessian" by the trade.

HIGH-PROOF.— Commercially all highly rectified spirits are termed "high-proof."

HOGGING.— The curvature upward of a beam between its ends — the reverse of sagging.

HOLLANDER.— In paper making, a special type of machine for beating up rag pulp.

HOLLANDS.— A term which, while formerly applied only to linens imported from the Netherlands, is now used to designate the glazed and unglazed linen cloths that are made in many places. "Brown Hollands" is a cloth that maintains much of the original color of the retted flax-fibre, it having been subjected to but little bleaching or boiling.

HONEYCOMBING.— In cloth-manufacture, a term applied to designate a thin fabric in which the stitches, running diagonally across the material, have been drawn tight in such a manner that the spaces between them are pulled or in relief.

HOP-JACK.— A term applied to a vat with a false bottom used in brewing. It is so arranged that it retains the solid substances in the mash-tube, but allows the wort to flow away after it has been boiled and the hops have been added.

HOPPER.— Used, in milling, to denote the inverted-cone-shaped trough through which the grain passes on its way to the shaking-shoe.

HORSE-POWER.— A term used as a unit of measurement in every industry in which power machinery is used. Although several values are assigned to this unit the prevailing value, both in America and England, is Watt's horse-power, which places it at 33,000 foot-pounds of work per minute, or 7,460 megaergs per second about three-quarters of the actual power of a horse. Indicated horse-power, commonly abbreviated I. H. P., is the actual work performed by the motive power, as calculated from the indicator diagram of cylinder pressures.

HOST.— In plant industry, an animal or plant which sustains the existence of a parasite.

HOT METAL.— In smithing, metal which is at forging or welding heat.

HOT SHORT.— Applied to iron which contains so much sulphur as to be brittle when hot. Also called "Red Short."

HOUSING.— In carpentry, a joint in which the whole dimensional body of one piece of lumber is let into another piece; as with the treads and risers in a staircase.

IMPOSITION.— The act of laying pages of type, etc., upon a smooth stone slab to secure them in the chases and prepare them for the press.

INDENTION.— A term used in printing to denote that a certain amount of blank space has been left before the line, or a specified number of lines of type. An indenting of every line after the first, with an increasing blank constantly shortening on both sides is termed "diamond" indention. An indenting of every line except the first, that being of full width and so overhanging the others, is termed "hanging" indention.

INFUSION.— A term used in brewing to denote the process of preparing the mash by treating the bruised malt with water at a temperature of from 70° to 75°.

INVERSION.— The alteration of dextrorotatory cane sugar into laevorotatory fruit sugar through the action of dilute acid. The product is termed "invert sugar."

JAPANNING.— The process of coating the surface of metal, wood, etc., with varnish which is immediately hardened by exposure to high temperature.

JIGGER.— (a) In mining, a mechanical appliance for sorting ore; (b) in pottery, the vertical lathe on which is made flat ware, like plates and saucers.

JOLLEY.— In pottery, a machine used in the manufacture of cups, jugs, and other hollow ware.

JUMPER.— In mining, a heavy hand-drill resembling a crow-bar, having a chisel edge, and operated by jumping it up-and-down in the drill hole, either by hand or machinery.

KERFING.— (a) The process of preparing wood for bending without breaking by making a series of small cuts in it with a sawing-machine; (b) in cloth-manufacture, the process of removing the wool by passing it through a shearing-machine.

KETTLESTITCH.— In book-binding, the chainstitching at the head and tail of a book, holding the sections firmly together previous to binding.

KIP LEATHER.— Leather made from the skins of young cattle raised in India.

KIPPERING.— In the fish trade, the process of curing fish by cleansing them, dressing them with pepper and salt, and curing them, either by drying them in the open air, or, artificially, by subjecting them to the smoke of some prepared substances.

KNOP YARN.— In textile manufacture, a kind of yarn which has been twisted in such a way as to form knops or bulging spots.

LACQUER.— A form of varnish made with an evaporable solvent; drying by evaporation and not by oxidation and resinification as do true varnishes.

LAGGING.— The non-conducting material with which boilers and steam pipes are covered to prevent waste of heat. The term is also applied to the operation of applying such covering.

LAMINATED WORK.— In carpentry, the beams or ribs built up from thin layers fastened together.

LAP.— In woolen manufacture, the fleece as it is delivered by the condenser.

LARRYING.— Bedding the inside bricks of a thick wall in thin mortar.

LAW CALF.— In book-binding, the calfskin commonly employed in binding law books. As a rule it is not dyed, and has a whitish appearance.

LAYER.— The vat in which hides are left to lie for six to ten months in a strong solution of tannin, towards the end of the tanning process.

LAYING.— The term is applied to two distinct stages in rope-making: (1) the twisting of three or more yarns to form a strand; (2) the twisting of three strands to form a rope. The machine that performs this operation is termed a "laying machine," the wooden cone placed between the strands to prevent a slack twist is termed a "laying-top."

LINE.— In linen manufacture, the best part of the flax fibre after hackling. If the roots and tips of the stems are cut off, it is more valuable, and is called "cut line."

LINGOES.— Lead weights varying from 12 to 20 pounds, steadying the harness in silk looms.

LOCK NUT.— A thin auxiliary nut screwed down upon an ordinary nut to prevent its loosening.

LOUVER.— A ventilating opening built like a Venetian blind, but with the slats not movable. It excludes rain, but admits air freely.

LUTE.— The refractory cementing material used to fill joints and cracks in high temperature furnaces.

MACERATION.— The softening of substances by soaking them in a fermenting liquid of a warmish temperature.

MACKLED.— In printing, the effect on a printed sheet which has dragged on the inked type at the moment of impression.

MANIFOLDING.— A term used in business circles to denote the process of making several impressions of a single letter or document by one operation, as by means of a manifolding-machine, or by the use of carbon paper.

MASH.— Used in brewing and distilling to describe the mixture of ground grain that has been infused in warm water.

MELLOWING.— In tanning, the aging of the tanning liquors through fermentation. The term is applied also to a similar process which goes on in harsh leathers, when dampened and laid in a pile.

MERCERIZING.— Treatment of cotton cloth with a cold solution of caustic soda while stretched taut, the soda being dissolved away by acid before the tension is released. The cloth becomes stronger, takes dye more readily, and acquires a silky lustre.

MILLING.— (a) The process of manufacturing cereals into flour or meal. There are two methods of milling: (1) low milling in which the grain is ground but once before being bolted, and (2) high milling, in which it is ground repeatedly; (b) in pottery, the operation of grinding and mixing the slip; (c) the process resorted to in tanning to open and soften the pores of hides; (d) in cloth manufacture, the process of felting cloth to thicken it; (e) the machining of metals with revolving cutters; also the corrugating of the rims of discs, coins, etc.

MOROCCO.— In book-binding, a fine quality of tanned goatskin.

MUFFLER.— An arched oven-like furnace in which crucibles are heated without direct exposure to the flames.

MULE.— In spinning, a reciprocating machine which draws and twists the thread when moving in one direction, and winds it on spindles on the return.

NIGGER.— In soap making, the dirty, watery layer which settles in the soap pans during the manufacture of filled soaps.

NIPPLE.— A short piece of pipe having a right-hand thread cut its entire length on the outside surface.

NOBLING.— The squeezing and hammering of a mass of spongy iron from a puddling furnace, to weld it into solid metal.

NOILS.— Small masses of clustered wool fibres removed from wool fleece by the combing machines.

PADDLING.— A method of tanning light skins in a vat in which a revolving paddle keeps liquor and skins in constant motion.

PANNING.— In placer mining, the gentle rotary shaking of a mass of gravel and water in a miner's pan so as to facilitate the settlement of the gold particles to the bottom. The fine sand and float with some of the water is allowed to slop over during the panning.

PASTE WASH.— In book-binding, a dilution of paste with water, used as a surface on which to lay the glair (q.v.) previous to gilding.

PATINA.— The delicate green incrustation which gathers on the surface of copper and bronzes after long exposure to the air. The finest patina is formed on those bronzes in which tin is in large proportion, and little or no zinc. It is imitated by immersing bronze in acetic acid.

PICKING.— In weaving, the throwing of the shuttle by the picker, or driver.

PIECE-GOODS.— The trade name for fabrics that have been woven in lengths suitable for retail sale by linear measure.

PIG.— (a) In glass manufacture, the grooved iron support for the blowpipes or working rods at the mouth of the glass furnace; (b) the form in which newly melted iron or other metal is cast for marketing.

PITTING.— A defect in varnish work showing tiny holes scattered over the surface, due to varnishing upon a damp or greasy surface.

PLACE BRICKS.— Soft bricks of use only for interior walls where they will be covered with plaster.

PLUS THREAD.— A thread cut on a bulge of a bolt or rod which has been made thicker where the thread is located, so that the diameter of the substance of the rod is not reduced by the depth of the thread.

POCKET.— In mining, a cavity containing a mass of ore which is not connected in any way with a vein or lode.

POINT.— The unit of measurement in types, each point being about one seventy-second of an inch. The various types in use in the United States and their relative sizes in " points " are as follows: Excelsior, 3 points; brilliant, 3½; semi-brevier, 4; diamond, 4½; pearl, 5; agate, 5½; nonpareil, 6; minion, 7; brevier, 8; bourgeois, 9; long primer, 10; small pica, 11; pica, 12; English, 14; two-line brevier, 16; great primer, 18; paragon, 20; two-line small pica, 22; two-line pica, 24; two-line English, 28; four-line brevier 32; three-line pica, 36; double paragon, 40; four-line small pica, 44, and four-line pica, 48 points.

POINTING.— In masonry, a neat finishing of joints between bricks or stones; accomplished by scraping out the rough edges of the original mortar and filling in carefully with a finer grade of mortar, which is often colored.

POLING.— In metallurgy, the reduction of copper oxide in molten blister copper, by the inserting into the liquid metal a pole of green wood. If too much wood is used the copper is said to be overpoled; if too little wood, it is underpoled.

PONTY.— In glass manufacture, an iron rod tapered for part of its length, used in working molten glass. In some localities it is called a " working iron."

PORGIE.— The raw material, largely menhaden, and much of it offal, from which fish oil is extracted.

PORTER.— In metal working, a bar attached to a fagot of rods or a forging, by which it is held and guided during the process of hammering.

POT ARCH.— In glass manufacture, a small furnace in which the glass pots or crucibles are fired before being used in the melting furnace.

POTSHER.— In paper manufacture, a machine for breaking and bleaching pulp.

POT METAL.— An alloy of copper and lead, with sometimes small additions of zinc and tin, used as a cheap substitute for brass.

PRIMING.— (a) The first coat of paint applied upon new work as a foundation for the subsequent coats. It is rich in oil, and has enough white lead to make a firm attachment; (b) the technical name for the foaming or frothing of water in a steam boiler, caused by greasy or dirty water, or by forcing the fire.

PROOF BAR.— In metallurgy, a rod of steel laid with a charge in a cementation furnace, and withdrawn at intervals to give evidence of the degree of progress of the operation.

PROOF SPIRIT.— That grade of dilute alcohol or alcoholic liquor which contains 50 per cent by weight of absolute alcohol. A larger percentage is " overproof," a smaller, " underproof."

PUDDLING.— (a) In metallurgy, the conversion of pig iron into malleable iron by burning out the carbon, sulphur and phosphorus in association with free atmospheric air; (b) the stopping of leaks and crevices in a reservoir with a " puddle " of clay with a little water.

PUGGING.— The rough plaster or slag wool filling placed between the beams of a floor as a deadener of sound.

PUG MILL.— In brick making, the mill in which the ingredients are mixed together. Also used as to a cement mixer.

QUARTER-PLATE.— A term used in photography to denote the size of a plate. Thus, a quarter-plate measures 3¼ x 4¼ in.; a half-plate, 4¼ x 6½ in.; a whole plate, 6½ x 8½ in.

QUENCHED STEEL.— Steel which has been hardened to an extreme degree by plunging it when red hot into cold water.

QUICKLIME.— Lime fresh from the kiln which has not absorbed moisture from the air and become air-slaked.

QUINCUNX.— A method of setting a group of fruit trees so that four of them stand at the corners of a rectangle and the fifth at the intersection of its diagonals.

RABBLING.— The stirring process in puddling iron, effected with a bar with a hooked flat end, called a rabble.

RACING.— A sudden increase in speed of an engine when released from its load; as when the propeller of a steamship is lifted from the water by wave motion in stormy weather.

RACKING.— In liquor making, the aging of the liquor by allowing it to flow in small streams or a very thin sheet from one vessel to another, thus exposing it to the air.

RAG BOLT.— An iron bolt with barbs or an enlarged end for embedding in masonry so it cannot be withdrawn.

RAGLET.— The groove cut in a wall into which the flashing (q.v.) is imbedded.

RAISING.— In woolen manufacture, the operation of drawing out a nap of fibre on the cloth by means of teazles; as in beavers, meltons, and pilot-cloth, and in blankets.

RECTIFY.— To redistil, as in making whisky, which is said to be rectified when it has been twice distilled.

RED SHORT.— See HOT SHORT.

REDUCING FURNACE.— A furnace in which the metallic elements are separated from their ores; as in a blast furnace.

REEDY.— In weaving. a streaky appearance due to the threads of the warp rolling in the splits of the reed.

REEF.— In mining, the outcrop of a vein of ore.

REGENERATING FURNACE.— A furnace in which the heat of the waste gases is used to heat the incoming air-blast. Where gas is used for fuel this also is heated by the hot waste.

REGISTER.— In printing, the accurate adjustment of type and paper so that the second page of a leaf is printed exactly on the back of the first page imprint.

RENDERING.— The first coat of plaster laid on a brick wall.

RETTING.—The treatment of flax by soaking it in water in which certain bacteria carry on a fermentation which releases the fibres.

ROAN.— A tanned and dyed sheepskin used in book-binding. It resembles Morocco, but is cheaper and not so durable.

ROASTING.— The process of heating certain ores to a temperature lower than the reducing point. It secures oxidation and the elimination of sulphur, and thus simplifies the subsequent reduction.

ROVING.— In textile manufacture, the tape-like band of sliver after preliminary twisting, and previous to spinning.

RUMBLE.— A revolving cylinder in which small castings are placed so that they may be cleaned of adhering sand and mould by chafing against each other.

RUSSIA.— In book-binding, a leather made of the skins of young cattle treated on the flesh side after tanning with the oil of birch, from which it acquires its characteristic odor. Cheaper grades are made of goat or sheep skins.

RUST JOINT.— A joint made in iron piping by filling the gap with a mixture of iron filings and sal ammoniac, which in a short time forms a compact hard and waterproof mass.

SAFETY PLUG.— A plug of fusible metal set into the shell of a boiler, and which melts when the rising pressure raises the temperature to the danger point, allowing the steam to blow off.

SALT A MINE, TO.— A swindling operation by which a mine is made to seem more valuable than it really is by the surreptitious introduction of ores obtained elsewhere.

SCREED.— A narrow strip of plaster laid accurately to the required surface, and used after hardening as a guide for the floats.

SETTING.— In leather manufacture, the smoothing and stretching of a hide until all creases and wrinkles are obliterated.

SEVEN POUND LEAD.— In plumbing, sheet lead of such thickness that one square foot weighs seven pounds.

SKIVER.— In book-binding, the thin grain split of sheepskin used for cheap leather bindings.

SHELLS.— Those parts of the lay in weaving in the grooves of which the reed fits. They are of two classes and are termed " upper " and " under " shells.

SLIVER.— The textile fibres gathered into a tape-like strand preliminary to roving and spinning.

SMUDGE.— In plumbing, a mixture of lampblack with other substances, smeared over a piece of work to prevent the solder from taking hold where it is not wanted.

SOAKING.— In metallurgy, cooling slowly a freshly cast ingot of steel in a soaking-pit — a hole in the ground fitted with brick chambers to receive the ingot and allow its heat to escape gradually

SOD OILS.— The oils obtained by pressing skins which have been curried with cod, whale, or olive oils. When refined, sod oils are highly esteemed for watches and other delicate machinery.

SOUPLE.— Silk fibre from which about half of its natural gum has been removed, rendering it lighter in weight and softer in feel.

SOURING.— In leather making, the treatment of leather with weak organic acids, to remove stains and bleach the surfaces preparatory to dyeing.

SPINNING.— In metal working, the formation of round hollow ware by pressing sheet metal into a mold revolving on a lathe.

SPLIT.— A skin which has been split into two layers parallel with its surface; usually effected by a cutting machine.

STOVE SCREW.— A bevel-headed screw with the thread cut close up to the head; used particularly for holding parts of stoves together.

STRIKER.— A pronged lever set astride a driving belt for shifting it on or off the driving pulley

STRIPPING.— The tearing or breaking off of the threads of a screw or the cogs of a gear-wheel.

SUINT.— The natural grease of sheep's wool. When refined, it is called lanoline.
SUMP.— In mining, an excavation below the level of the mine floor, in which water collects.
TACKY.— The condition of the surface of paint or varnish before it is quite dry, so that it is slightly sticky when touched gently with the dry finger.
TAP.— In pipe-fitting, the tool which cuts internal or female threads. The tap first used in this operation is slightly tapered, and is called the "taper tap."
TEMPERING.— In pottery, the mixing and working of the clay into proper condition for molding.
TOOLING.— In book-binding, the ornamentation of a book cover by pressing lines into it with heated tools. They are "blind lines" if without gilt. A book so ornamented is said to be tooled.
TORCHING.— The coat of plaster applied on the under side of a roof of tiles laid on battens.
TOSSING.— In metallurgy, the oxidation of impurities in melted tin by lifting the metal in ladles and pouring it slowly back from a height, thus exposing it to the air.
TOUTER.— Industrially, a person who makes it his business to solicit trade for a shop.
TOW.— The short and twisted fibres of flax separated out in the process of combing. It is carded and spun into coarse rope yarns.
TREBLES.— Sheet iron of gauges 25 to 27 in the Birmingham wire scale.
TREE CALF.— In book-binding, a brown calf which has been stained and squeezed to produce a conventional tree-like pattern on its surface.
TUP.— The principal mass of iron in a steam hammer head to which is attached the steel face piece.
TUYERE.— The nozzle through which the air-blast enters a blast furnace.
UNION.— In textile manufacture, a cloth in which the warp is of one kind of fibre, and the weft of another.
VALLEY.—The V-shaped hollow between two intersecting roof surfaces.
VAMPING.— In leather making, the undue swelling of a hide during the liming process.
VENICE TURPENTINE.— An oleo-resin obtained from the sap of the larch. It dries very slowly and with considerable body.
WALING.— The horizontal pieces which support the planking at the sides of a trench.
WALL.— Used in mining to denote the surfaces of the rock between which the ore is inclosed. If the vein is inclined at such an angle that the ore is over the miner's head it is termed a "hanging" wall; if it is beneath him it is called a "foot" wall.
WARBLE.— In leather manufacture, a small hole in the hide pierced by the bot-fly.
WARP.— (a) In agriculture, the operation of fertilizing a poor piece of land by artificial inundation from waters which have large quantities of earthy matter; (b) in weaving the threads that extend lengthwise in a loom. The roller upon which the threads are wound is termed the "warp-beam"; the machine which treats them with size before they are wound is the "warp-dresser," while the machine which draws the warp threads through the dye beck is termed the "warp-dyer."
WASH.—Used in mining to denote the process of separating the ore from earthy and other matter by the employment of water. The fermented wort from which the spirit is extracted in distilling is also termed the "wash."
WATER GAS.— A fuel-gas produced by blowing steam over a bed of red-hot coals. It carries about 40 per cent of carbon monoxide, and is a deadly and quick poison. It is sometimes used for illuminating with Welsbach mantles, and is sometimes carburetted so as to give the ordinary yellow gas-flame. Its use in house lighting is forbidden in many communities.
WEFT OR WOOF.— In weaving, the thread which is carried by the shuttle, and is laid transversely to the warp.
WINNING.— The work of developing a mine preparatory to the work of mining is termed "winning."
WIPED JOINT.— In plumbing, a joint made to connect two ends of lead pipe which abut each other. One end is slightly expanded so the the other will set into it, and the joint is then encased in plastic solder, which is shaped by continually wiping it with a cloth until it has set.
WORKING IRON.— See PONTY.

INDUSTRIAL VOCATIONAL TRAINING. See EDUCATION, ELEMENTARY.

INDUSTRIAL WORKERS, Education and Training of. Industrial education is that form of education, whether given in a school, a factory or elsewhere, the controlling purpose of which is to train for wage-earning, or to advance the power of wage-earning in the trades and industries. It must be considered from the standpoint of education as well as of industry. Education is the fitting of the individual to take his place and do his part in the life of his community and his time. Industrial education is, then, the fitting of those who are in industry effectively to serve and to achieve in and through their field of activity. There are 9,000,000 wage-earners in the factories of the United States, supporting directly and indirectly including themselves upward of 30,000,000 people. They are working in 275,791 factories. Their educational and economic development are of utmost consequence from whatever standpoint it is viewed. The joy of life, if not its purpose, is service, self-expression, achievement. The daily task may be easy or difficult. If it is simple, that is no reason for allowing the worker to do it poorly. If he can be taught to do it with proficiency in a week or a month, not to say a year, without loss of wages meantime, he has as great right and need of this brief training as a professional man to the 10 or 12 years of additional training which the public rejoices to give him without charge after the period at which the working boy leaves school.

Great as have been the faults of Germany, she so thoroughly developed the industrial intelligence of her workers as to surprise the world. Sixty-five per cent of the men in the topmost places in her industries, in both the managerial and technical fields, came from the ranks of her working boys, who quit the regular schools at from 12 to 14 years of age, but by industrial education, which interpreted their daily tasks and made clear the ways of advancement, in apprenticeship and continuation schools (wherein education is "continued" after leaving the common schools), these boys, as men, surpassed most of the graduates of her higher technical institutions in the attainment of high industrial positions.

Joy in work comes from mastery of work. We like to do what we can do well. We dislike to do what we fail to understand or do poorly. The dislike of work of many who labor is due in great measure to the state's neglect educationally in not teaching the mastery and the dignity of labor. "The latest gospel in this world is, know thy work and do it. All true work is sacred; and in all true work, were it but true hand labor, there is something divine." (Carlisle). It is the inherent right of every person to be taught to express himself effectively and happily in some field of the world's work, small or large, and by mastery therein to serve himself and society to best advantage. Never taught one thing only that he may rest with that, but so that through the mastery of one thing and the learning of another, he may rise to the limit of his abilities. However much a nation develops its natural resources, it is economically blind if it fails fully to develop its human values, which are the one natural resource which gives value to all others, and the only one that increases with use. The economic value of the human efficiencies of the working people of the United States is estimated at more than $200,000,000,000, or five times the value of all other natural resources combined. The spiritual values, the happiness and self-respect, that come of developed efficiency are incalculable. It is for these and other considerations that each community in the

United States spends upon public education about one-third of all its tax receipts, making a national total of about $650,000,000 annually, aside from an investment of more than a billion dollars in school plants, and both items rapidly increasing. But all this is apparently with the college as the aim, although only 3 per cent of the people take the college course. About $5,000 of public funds are spent upon anyone who fits himself for a profession, but scarcely a dollar especially to fit in his occupation any one of the 96 per cent of the people outside the professions.

Education is a state function. Whatever is done must be by the several communities under the requirement and supervision of the state. Most states require attendance at the public school of all children from the 7th to the 16th year, with, however, the important provision that after the 14th year any child may secure, if he wishes, a working certificate permitting him to leave school forever, with the further provision, in some States that he has completed the sixth grade of the common school, and in other States simply that he is able to read and write the English language acceptably, this latter provision often being carelessly regarded.

Only one child in 30 graduates from the high school; only one in five enters the high school; only one in three finishes the high school; and only half the children who enter school finish the 6th grade. By the end of the 6th grade children have learned little or nothing of fractions, nothing of decimals, only a little local geography and nothing of the rights and obligations of citizenship and the social order. Investigation indicates that the great majority of that half of all American children who leave school by the 6th grade and the 14th year of age are not compelled to by financial circumstances. They leave because they have reached the period of adolescence, at which time the will and the creative faculties assert themselves and nature impels them to "do things," unconsciously to imitate Him who in the six days made the world. This impulse is especially compelling with concrete- or hand-minded children. Those who continue in school are mostly the imaginative children to whom the world of books is often very real.

The mind of man is said to be "hand-made." Through the hand the race has learned a great part of all it knows. Work must be interpreted and made an instrument of education for the vast number who apparently will be educated, if at all, only in and through the life of labor. Legislation might compel these workers to remain in the common schools away from labor and income for a short period longer, often without advantage, sometimes to their hurt, and never to their adequate education, as education must be made available throughout the better years of life.

It is coming to be generally realized that each state must, following the best practice of the countries of Europe, set up and foster, financially and otherwise, educational facilities for the effective advancement of the millions of wage earners in the industries and elsewhere, with their daily needs and experiences as the centre of interest in their educational activities. The foremost industrial nations of Europe by apprenticeship and otherwise have for generations so trained their industrial wage earners. It is commonly conceded that Germany took the lead in the year 1885 in a series of legislative provisions which in the following years have developed a system of industrial education as effective for her wage-earners as are the provisions common to all countries for professional training. She finally came to require in great sections of that empire that every working child under 16, and in the best practice under 18, shall be released by the employer for from 8 to 12 hours per week during working hours, while fresh and vigorous, for training in his occupation or in a better one if need be.

We speak of "blind-alley" and hopeless jobs as the lot of our working children. Germany discovered that there is no such thing as a "blind-alley" job; that there is no job but may lead to high accomplishment under intelligent direction. Consequently 85 per cent of American working children are in "blind-alley" jobs, from which their elders see no way out, while in Munich 85 per cent of the working children are trained in connection with their work in ways that lead readily to high places.

France, Switzerland, Denmark and other nations have legislated in effect like Germany but less extensively. England, impressed by the Continental practice, and especially by German methods and success, planned so to legislate in 1914 but was deterred by the World War. She paused, however, at the height of the conflict, on 8 Aug. 1918 to enact educational measures requiring every child to attend the regular schools from the 5th to the 14th year of age and empowering local authorities to increase the compulsory period until the 15th year. Compulsory day continuation schools must be established for all young persons, unless they are being otherwise educated, up to the age of 16, and after 1925 up to the age of 18. The minimum number of hours of attendance per year at continuation schools shall be 280 and after 1925 shall be 320. Thus England, formerly the most backward of the great European nations in vocational training, takes an advanced position, far ahead of the United States.

Of all these nations, Germany failed to require the teaching of citizenship, of the rights, duties and obligations of the worker as a member of society. In 1903 her greatest authority, Dr. Kerschensteiner, lamented that her industrial schools "did not contain a single subject of instruction which serves any other purpose than the acquisition of technical skill and knowledge, or the promotion of trade efficiency." Since that time, a poor beginning was made in this training but in a way regretted by many of her own leaders in that it did little more than inculcate a false exaltation of her ruling classes and a blind obedience in all others. What we sow, we reap. To fail to educate in efficiency is to suffer inestimable economic loss. Not to teach the duties and obligations of citizenship, is to endanger the democracy of the world.

In the United States in the last 15 years the legislatures of several States have enacted permissive legislation authorizing local boards of education to require the attendance of all working children under 16 upon part-time or continuation schools, but in all these States only

one city, Boston, had the courage to act in 1916, with New York city following later in a less extensive way.

State legislation which merely authorizes a local community to require the attendance of its working children upon continuation schools is therefore shown to be inadequate and virtually useless. It is a shirking of legislative responsibility as respects the lives of working children. If the State as such will not safeguard its children, single communities will not.

In 1911 Wisconsin required that every working child in cities of 5,000 population or more attend continuation school for four hours a week until 16 years of age for eight months annually, which provision was later extended to eight hours per week for 10 months until 17 years of age. This legislation proved entirely practicable. It was readily accepted by employers and all others as of high social and economic advantage and is evidence that any State can thus serve its working people. In 1915 Pennsylvania required that every working child under 16, in whatever occupation, attend continuation school for eight hours weekly during working hours. All-day trade schools have proved ineffective as a means of general industrial education. They were tried and generally abandoned in Continental Europe long ago. Working people either cannot or will not attend such schools and forego income and the experiences and hopes that lie in the field of labor for the years required for training in such schools. From 1880 to 1910 there was much agitation for the establishment of these schools in the United States. In those 30 years, however, only 13 such schools were established with a total attendance of less than 2,000 students, being not more for the whole country than should receive industrial training in the average manufacturing city of 50,000 people. The training in these schools is so general in character as to lack immediate interest and not to fit for the specific tasks their graduates enter upon. The cost to the public averages from $150 to $200 per pupil per year. There are 2,000,000 working children under 16 in the United States in industry, agriculture and commerce and more than 5,000,000 under 18. All these children have equal right and need of training in their occupations. There are 30,000,000 older wage-earners to whom the opportunity for training for advancement should be open, many of whom would avail themselves of it. In a single typical industrial city, Milwaukee, it was estimated that a relatively small number of superior wage-earners in her industries in 1910 were sending $80,000 annually to correspondence schools for such industrial training as they could so secure. It was then that Wisconsin provided that her wage-earners should have education in their occupations in continuation schools directly adapted to their circumstances even as her university provides for those who are more fortunately circumstanced. Said the Pennsylvania superintendent of schools, "to educate all children who need it, through any such all-day, all-week schools as have been developed yet, would bankrupt any State." And the loss in wages to the learners would be as great as the cost to the State. The correlation of instruction in continuation schools with the work in the factory makes both work and school educational.

The cost of superior continuation school training in Europe is about $25 per pupil year. It sometimes costs less in the United States because it is not yet of the European quality. The increased interest and efficiency of the workers in the factory should equal or exceed this cost. Because of this increase in efficiency in the factory many great manufacturing institutions in the United States introduced training departments at their own expense during the war period for the training of new workers and the up-grading of old employees, spending in several instances as much as $50 per learner. By this expenditure the employer secured a more contented worker, reduced labor turnover greatly and reduced the wastage of materials. Since the war many of these establishments are continuing these training departments and other manufacturers are introducing them as an essential means of development for the vast production of peace times.

Among the essential provisions for industrial training for all who need it may be noted: First. It must be part-time or continuation, therefore, not requiring the worker to abstain from work and income. Second. Attendance must be made compulsory by the State for all working children under 16, or better 18, during working hours and readily available to all older persons through life at their option so that any worker may continually uplift himself by securing at all times whatever instruction he needs to qualify for the next step forward. Compulsion in the matter of school attendance of young children is only the recognition of the right of the child and the duty of the State, and this recognition expressed in terms of agreement and action. Wherever tried it finds ready acceptance. Third. Industrial schools, and equally those for agriculture and commerce, must be under the control and direction of special State and community boards whose personnel is directly representative of industry and labor. The leading nations of Europe after trial of all other methods insist upon this practical direction and place this education in the Department of Commerce or Labor and not in the department of general education. Only those with life-long and successful experience in industry can know when industrial education is truly industrial and make it so. Wisconsin accepted this principle in establishing a State Board of Vocational Education consisting of three employers, three wage-earners and the State superintendent of schools, the latter being the link between the general and the industrial schools. She also provided that the general board of education in each city appoint a board of vocational education consisting of two representative employers, two wage-earners and the city superintendent of schools, with full authority, subject only to the State board of vocational education. The Federal government, upon advice of the leading organizations of wage-earners, employers and others accepted this principle in making the Federal board of vocational education consist of the Secretaries of Labor, Agriculture and Commerce and one lay representative each, from labor, agriculture and commerce. This Federal board is advisory to

State boards of vocational education and distributes Federal aid in amounts increasing annually until 1925 and thereafter when it aggregates $7,000,000, being $3,000,000 each for industry and for agriculture and $1,000,000 for the training of teachers, but limited in each case to not more than one-half the total spent by a State for these purposes. In Massachusetts and Connecticut a limited number of industrial schools have been highly developed under the supervision of the general State Board. This Board, however, is composed principally of, and in industrial matters dominated by the judgment of, especially qualified manufacturers. In American States where academic school influences control in the direction of industrial education, as formerly in Europe, this education is remote, impractical, lacking in "production" sense and ineffective. Fourth. Training in industrial schools must be upon production, i.e., the making of real things for commercial use in the same manner as they are produced in factories. In Massachusetts it is required that industrial schools "shall conduct a productive shop which conforms in all desirable factors with commercial standards. The work on which pupils are trained shall be planned and perfected with reference to its commercial value and shall be judged by commercial standards." "The most effective shop work is that done on a commercial basis for an outside customer. Work done to fill pupils' orders is least satisfactory." "The general atmosphere, system, standard, practice and administration of the school shall be that of a good industrial shop."

It has been objected to this method that it commercializes education and takes bread out of the wage-earners' mouths by supplying the market from public institutions. The value of school products, however, is inconsequential, being about one-third of the salaries of the teachers who are taken out of industry, or from one-fifth to one-tenth of what these teachers would produce were they left in industry as wage-earners. The leaders of labor support this position in all communities where it has been well worked out. Fifth. Teachers of processes and operations must have had extensive practice and successful experience in factories. They should have that developed "sixth sense" common to the professions, indicating thorough appreciation and understanding of the intricacies and methods of the production. Only the related academic instruction may be given by instructors whose shop experience has been less extensive. Sixth. Every trade must be taught, that of the baker, jeweler, barber, tin-smith, potter, watchmaker, decorator — every trade requiring developed skill — and not the four or five trades only that are commonly taught in old-time trade schools. In Munich there are some 60 schools teaching 50 trades, besides 15 schools for the least intelligent workers who must follow the unskilled trades. These workers are taught to keep personal accounts, how best to use their slender incomes and the fundamentals of citizenship. Seventh. Instruction must be directly correlated with the daily tasks and experience of the learner. Boys and men learning the butcher's trade must be taught to cut all kinds of meat and figure on shrinkage, waste, etc. A butcher shop cannot be in a public school. Consequently a local commercial shop must be used. A large city can have a commercially operated bakery in its industrial school. Smaller communities can readily arrange to use for a few of the dull hours of the day the facilities of a local baker, he giving the practical instruction and advising concerning the related instruction.

Instruction in citizenship should make much of local institutions, social and industrial, as a point of contact.

Mathematics and English should in each case be taught in terms of the learner's occupation.

The following brief excerpt from Industrial Continuation Courses are illustrative:

(a) From a course for boys from 14 to 18 in a school in a tannery;

Monday — Review of Chrome re-tan and Combination tannage:

I. Chrome re-tan.
  1. Solution for re-tan.
    a. 2 per cent tannoline to 100 lb. leather.
    b. Run in drum two hours.
    c. Horsed five hours.
  2. Purpose.
    a. To tan green spots.
    b. To make leather firm and solid.

II. Combination 10 hours.
  1. Cossack only has combination tannage.
  2. Chrome re-tanned first.
  3. Horsed 10 hours instead of five hours.
  4. Solution.
    a. Extracts used are quebracho, hemlock, spruce, gambier.
    b. About 100 lb. extract to 1000 lb. leather.
    c. Run in drum five hours.
  5. Horsed 10 hours.

Tuesday — Lecture of Foreman of Stuffing Department.

I. Definition of stuffing.
II. Purpose of stuffing.
III. Kinds of leather and processes.
  1. Hemlock tannage.

* * *

(b) From outline course in painting

Painting: Sample exhibit from outline course.

8. Filler.
  a. Silex.
9. Wax.
  a.
10. Water paints.
  a. Kalsomine.
  b. Whiting.
  c. Chalk.
  d. Lime.
  e. Colors and binders.
11. Supplies.
  a. Pumice.
  b. Patten stone.
  c. Curled hair.
  d. Sand paper.
  e. Steel wool.
  f. Sponges.
  g. Chamois.
  h. Cheese cloth.
  i. Muslin.
  j. Cotton waste.
  k. Burlap.

C. Color study.
  1. Pigments and colors.
    a. Primary.
    b. Secondary.
    c. Intermediate.
    d. Complimentary.
  2. Quality of color.
    a. Value of tone.
    b. Degree of light which color reflects.
    c. Tints and shades.
    d. Intensity.
  3. Color analysis.
    a. As to hue, value and intensity.
    b. To enable individual to qualities indicated above.
  4. Color harmony.

D. Design.
  1. Shape.
  2. Harmony of proportion.
  3. Rhythm or interrelation.

E. Commercial practice.
  1. Reading plans and specifications.
  2. Methods of buying.
  3. Preventing waste and losses.
  4. Forms for doing business.
  5. Building codes.
  6. Laws relating to
    a. Contracts.
    b. Liens.
    c. Bonds.
    d. Insurance.

* * *

(c) Civil government. Tentative outline of suggestive nature common to all students.

I. HOME.
- A. Purpose.
  - Social, civil, educational.
- B. Organization.
  1. Father.
  2. Mother.
  3. Children.
  4. Relatives.
- C. Operation.
  1. House.
  2. Facilities.
     - a. gas.
     - b. water.
     - c. light.
     - d. food.
     - e. heat.
- D. Maintenance.
  - Source of:
  1. Occupations:
     - a. Father.
     - b. Mother.
     - c. Brother.
     - d. Sister.
     - e. Relatives.
- E. History.

* * *

II. INDUSTRY. (Select prominent industry in locality).
- A. Purpose.
  1. To the individual.
     - a. Provides occupations through which to develop ability and opportunity for service.
     - b. Provides income.
  2. To the community.
     - Production.
- B. Organization.
  1. Directors or owner.
  2. General manager.
  3. Superintendent.
  4. Foreman.
  5. Assistant foreman.
  6. Other employees.

* * *

  5. Regulation of industry.
     - a. Hours of labor.
     - b. Wages.
     - c. Insurance.
       - Accident.
       - Sickness.
       - Old age.
     - d. Education.
       - Part-time — day.
       - Apprenticeship.
       - Evening schools.
       - Dull-season schools.

* * *

III. THE INDUSTRIAL REVOLUTION.
- A. The primitive family as the industrial unit.
- B. Combinations of families.
- C. Development of specialization in industry.
- D. Concentration in cities for
  1. Power.
     - a. Water.
     - b. Steam.
     - c. Electricity.
     - d. Gas.
  2. Shipping facilities.
     - a. Water.
     - b. Railroads.

(Note: Trace out the industrial development of your locality along these lines).
- E. Effects upon the community.
  1. Home life.
  2. Employment of
     - a. Men.
     - b. Women.
     - c. Children.
  3. Wages.
     - a. Day work.
     - b. Piece work.
     - c. Bonus.
     - d. Profit sharing.
     - e. Co-operation.

* * *

IV. COMMUNITY MANAGEMENT. (City, state and nation. Work out first for your city according to outline, and then for state and nation).
- A. Purpose.
  1. Discussion — bring opinions from homes.
- B. Organization.
  1. Mayor-council system.
  2. Commission system.
     - Commission manager or council manager system.
  3. Departments.
     - a. Justice.
     - b. Education.
     - c. Public works.
     - d. Fire.
     - e. Police.
     - f. Charity.
  4. Operation.
     - a. City Hall.
     - b. Schools.

IV. COMMUNITY MANAGEMENT — Cont'd.
     - c. Streets.
     - d. Parks.
     - e. Play-grounds.
     - f. Fire houses.
     - g. Jails.
     - h. Hospitals.
  5. Maintenance.
     - a. Taxation.
       - Land.
       - Improvements.
       - Personal property.
       - Poll tax.
       - Corporation tax.
       - Income tax.
       - Inheritance tax.
       - Liquor.
       - Tobacco.
     - b. Licenses.
       - Occupations.
       - Privileges.
       - Ownership (automobiles, dogs, etc.).
- C. History.
  - Develop history of above topics in your locality.
- D. Maintenance.
  1. Labor.
     - a. Kinds (to be obtained by children from particular industries studied).
     - b. Rates of payment.
     - c. Opportunity for advancement.
     - d. Quality of — skilled or unskilled.
     - e. Supply of and demand for.
     - f. Annual pay-roll.
  2. Product.
     - a. Nature.
     - b. Amount by physical units.
     - c. Market.
     - d. Value.
     - e. Total sales per annum.
  3. Overhead — Expenses, such as light, heat, interest, insurance, rent, depreciation, non-productive labor, etc.
- E. History of.
  1. Location.
  2. Establishment.
  3. Development.

(Note: Apply foregoing outline under II to several local industries).

Eighth. Most of this training for working children must be given in public schools and a large part of it for older workers. Schools or training departments must, however, be set up in factories under State supervision for that great part of the 9,000,000 factory workers who do not need or will not take an extended course in training in the industrial schools.

The development of industrial training departments in factories for the quick intensive fitting of new workers to their tasks and the upgrading of more experienced workers has been one of the interesting experiences of the great war. Such training departments are also known as vestibule schools. France and England found these factory training departments a war necessity for replacing enlisted, skilled men by women and for developing in old employees the high technical skill required in war production. The French Ministry of Munitions early in the war required every manufacturer employing 300 workers or more to install these training departments. The British Ministry of Munitions in many of its contracts for war supplies required this of her manufacturers. In the United States the Council of National Defense through its section on industrial training assisted manufacturers in their development of training departments in the earlier months of the war. The United States Training Service, established in August 1918, then became the Federal agency in this field. Since the armistice so many factories are using this method as to give promise of a great improvement in American productive methods and of happier and greater production by the

wage-earners. It is estimated that 25 per cent increase in production is secured through factory training departments. Of the 9,000,000 industrial workers, nearly one-half are in 3,000 factories; 1,613,000 are in 833 factories of 1,000 or more employees each. The desirability of developing in these factories inexpensive and intensive industrial training highly acceptable to wage-earners and employers is evident. The fast developing appreciation of industrial education available to all who need it of whatever age, and of using to this end the resources of the public schools and the vaster and infinitely varied facilities of the factories of the country upon the invitation of their owners is one of the better omens of the new democracy. See EDUCATION, INDUSTRIAL.

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INDUSTRIAL WORKERS OF THE WORLD, or **I. W. W.**, a labor organization of revolutionary character, with tenets similar to those of the Syndicalists. The strike of the Western Federation of Miners at Colorado in 1903 brought to a head the grievances of labor and its need for new centralization. A conference of labor leaders was held at Chicago in 1904, which resulted in a general convention of labor delegates a few months later at which the leading principles of such an organization were outlined. Another convention took place in 1906. The many factions which constituted the labor revolutionists fought for supremacy, and several schisms widened and separated the groups. The «revolutionaries» opposed the «reactionaries»; the «political» and «industrial» socialists could not agree; and the local trade-unionists were pitted against the believers in one all-embracing union of workers. A fourth convention produced the final preamble which may be briefly outlined by some of its leading principles: «The working-class and the employing class have nothing in common. Between these two classes a struggle must go on until the workers of the world organize as a class, take possession of the earth and the machinery of production and abolish the wage system.» «It is the historic mission of the working class to do away with capitalism.» «An injury to one is an injury to all.» The organization differs from syndicalism in that it proposes to build up, after the pattern of capitalistic organization, but on revolutionary lines, a tremendous and all powerful organization of all workers. It does not desire to remodel existing trade unions, but to establish a new and broader organization. It has no use for mediation, conciliation or arbitration, and considers no contract binding on employees. To strike whenever they can inconvenience employers most is the fixed policy of the members. They endorse sabotage (q.v.), the general strike and all forms of direct action.

The I. W. W. is composed of 535 recruiting stations; industrial unions having a total membership of 85,000; and five national administrations at Hawaii, Australia, New Zealand, Great Britain and South Africa respectively. The constitution and by-laws provide for membership of local industrial unions directly federated with headquarters, local recruiting unions, industrial councils and individual members. The membership of these last mentioned fluctuates considerably, depending on disturbed conditions and strikes for increase. Recently the I. W. W. has made tremendous efforts to reach the agricultural laborers. All alliances with political parties are refused. The organization has trained strike leaders and propagandists throughout the country who have been conspicuous in notorious campaigns, notably the Lawrence, Mass., strike in 1912, the strikes in the mines at Bisbee, Ariz., Mesaba Range at Minnesota and Everett, Wash., 1916. The organs of the movement are *Solidarity*, the official English paper; the *Industrial Worker* published at Seattle, Washington and papers in foreign languages including the Hungarian, Polish, Lithuanian, Spanish, Yiddish, Swedish, Slavonian. Defense of imprisoned leaders has become one of the points for concerted effort among this group of revolutionists.

At the convention held on 20 Nov. 1916, a pertinent war declaration was adopted. «We condemn all wars and for the prevention of such we proclaim anti-militarist propaganda in time of peace, thus promoting solidarity among the workers of the entire world; and in times of war, the general strike in all industries.» The unpatriotic efforts of the I. W. W. in this latter direction after the United States entered the war in 1917 were suppressed by the government with severe measures of imprisonment and fines. (See SYNDICALISM). Consult Brooks, J. G., 'American Syndicalism; the I. W. W.' (New York 1913); Brissenden, S. F., 'The Launching of the Industrial Workers of the World' (Berkeley, Cal., 1913). In recent numbers of the 'Readers' Guide to Periodical Literature' complete lists of timely magazine articles will be found describing and discussing the latest operations of this organization. Consult especially Parker, C. H., 'The I. W. W., A Different View' (in *Atlantic Monthly*, November 1917).

INDUSTRIALISM, a term of somewhat vague significance, employed in different senses by different writers. With some it is a type of social organization; with others it means our present system in which industry predominates as militarism did in past centuries. According to Spencer it is a theoretically possible form of society purely industrial in all its activities. The last is the sense mostly frequently attacked by preachers, pseudo-reformers and others.

INDUSTRIES, Welfare Work in. An interesting and valuable feature of modern industrial life is the attention given by many employers to the safety, comfort and health of workers. The new impetus in this field takes its origin not only from philanthropic and paternalistic motives, but from the demands of modern business for scientific management and industrial efficiency. In addition to reform legislation making many such measures effective, an increasing number of employers have found it expedient to adopt various methods for safeguarding and protecting their employees. The result has been manifest not only in the improvement of the immediate working environment and the creation of numerous safety devices, but in the provision for lunch and rest rooms; recreation facilities, rest periods in monotonous work; medical inspection and attention which includes all arrangements from

simple first aid to elaborate hospitals, factory physicians, sanitariums, home care by nurses; social organization and education of workers; housing facilities; insurance, pension, etc. A welfare secretary is often employed whose duties consist in caring for the general personal interest of the employees, and in addition, the engaging and readjusting of labor, the meeting of complaints and solving the problem of discipline. The principle of the entire work is the most economic use of the energy available by the right adjustment between the worker and the machine and the adaptation of both to the general work. The result from the employer's point of view has been a marked increase of output because of the lessening of fatigue, the adjusting of the "man to the job" and the heightening of interest on the part of the employed. In connection with the European War, studies of the labor problems have established the fact that such measures for industrial betterment heighten human efficiency and lessen the fatigue and monotony consequent to excessive demand for labor on diminished physical forces. (See LABOR LEGISLATION IN THE UNITED STATES). Consult Proud, E. D., 'Welfare Work' (1916); Cadbury, E., 'Experiments in Industrial Organization' (London 1912); Hoxie, R. F., 'Scientific Management and Labor' (New York 1915); Whitney, A. L., 'Rest and Recreation Rooms and Rest Periods for Employees' (in monthly review of United States Bureau of Labor Statistics, Vol. V, October 1917, No. 4); id., 'Medical, Surgical and Hospital Treatment for Employees' (id., September 1917, pp. 59–67); Goldmark, Josephine, 'Fatigue and Efficiency' (1912).

INDY, an'de', **Paul Marie Théodore Vincent d'**, French composer: b. Paris, 1851. His early instruction on the piano was received from his mother under whose tutelage he mastered the instrument before his 14th year. Subsequently he studied under Diémer, Lavignac, Marmontel and César Franck. He served in the army during the war with Germany in 1870–71. He entered the Conservatory of Paris after the war and in 1873 was a member of the organ class there. Subsequently he was employed as choirmaster by the Société des Concerts du Châtelet. He was made manager of the National Musical Society in 1885, and president five years later. He served also as inspector of music in the Paris schools and managed several choral societies. In 1896 he was one of the founders of the Schola Cantorum. He visited the United States in 1906 and there conducted his own works with the Boston Symphony Orchestra. He has written the operas 'Fervaal' (1897) and 'L'Etranger' (1903) but is pre-eminent as a composer of instrumental music. He has written 'Jean Hunyade,' 'La forêt enchantée' and 'Wallenstein,' symphonic poems; two orchestral suites, 'Le chant de la cloche,' a dramatic legend; orchestral pieces, some chamber music, choruses, piano and organ pieces. He published biographies of César Franck (1906) and Beethoven (1910). In collaboration with Sérieyx he wrote 'Cours de composition musicale' (3 vols., 1902–12). Consult Borgex, L., 'Vincent d'Indy; sa vie et son œuvre' (Paris 1913) and Sérieyx, A., 'Vincent d'Indy' (ib., 1914).

INEBRIETY. See ALCOHOLISM.

INERTIA, in physics, denotes the mechanical continuance, or persistence, of energy in existence. The German language has two words for our word "inertia." An explanation of these should serve as an illustration of the way in which inertia is used in a dual sense by English-speaking physicists. *Beharrung*, the better of the two German terms, because it is a positive expression, has been defined above. The other German word is *Trägheit*,—a literal German translation of what we commonly mean by inertia. But there are some experimental as well as theoretical considerations which reveal that whenever one understands by inertia the non-appearance of new energy, or motion, or activity,—and this is the meaning of *Trägheit*—one does so by laying all the emphasis on a merely negative characteristic of inertia. A gentleman of Vienna, J. Popper, alluded while conversing with Prof. Ernst Mach, a distinguished physicist, to an interesting parallelism subsisting between the meaning of inertia as used in physics and the meaning of heredity as employed by biologists. Mach's version of Popper's remarks was given in an inaugural address delivered on assuming the rectorate of the University of Prague, from which we quote as follows: "Take a body in motion; the body retains the velocity acquired in (or *inherited* from) the interval of time just preceding, except it be changed in the next moment by an accelerating force. In the case of the body in motion the change of velocity (abänderung) was looked upon as a matter of course, while the discovery of inertia (or persistence) created great surprise; in Darwin's case, on the contrary, the heredity (or persistence) was taken for granted, while the principle of variation (abänderung) appeared novel." From this is revealed the notion of continuity or persistence underlying both the idea of heredity and the idea of inertia. Inertia thus places emphasis on the idea that so long as nothing interferes to bring about change everything in nature will remain as it is. The law of inertia indeed explains itself. Wherever we meet with it, it need not be accounted for. An explanation becomes necessary only when inertia appears to be lacking.

The term is thus used to denote the law of the material world that all bodies are absolutely passive or indifferent to a state of rest or motion, and would continue forever at rest, or persevere forever in the same uniform rectilinear motion, unless disturbed by the action of some extrinsic force. Even in ancient times thinkers attributed to matter a certain inaptitude, reluctance or renitency to motion. But that a body in motion required the operation of an extrinsic cause (potential or actual) to bring it to rest was first discovered by Galileo. He was led to this discovery through his examination of the principle of the height of ascent. Kepler, conceiving the disposition of a body to maintain its motion as indicating an exertion of power, prefixed *vis*; and the compound expression *vis* inertia ("force of inertia") though less accurate than inertia merely, has been nevertheless generally retained. Huygens, upon whose shoulders the mantle of Galileo fell, formed a sharper conception than the latter had of the law of inertia. He achieved this by generalizing the principle respecting the heights of ascent, a principle laid

under contribution by Galileo. Huygens writes: «If gravity did not exist, nor atmosphere obstruct, the motions of bodies, a body would keep up forever the motion once impressed upon it, with equable velocity in a straight line.» It may be mentioned in passing, that the principle respecting the heights of ascent employed by Huygens in this connection, is identical with the principle of excluded perpetual motion. Newton showed that if the property of inertia is possessed to an equal degree by two different substances these substances will have equal heaviness or weight. So it appears that that part of the principle of inertia involving continuance in rest if undisturbed was known even to the ancients, and by them attributed to a certain repugnance of matter to motion. It was thus reserved for Galileo to show that the remaining portion of the principle was equally true and general.

The word inertia occurs in compounds; viz., as in moment of inertia. The moment of inertia of a body or a system of bodies upon or round an axis is the *sum* of the products obtained by multiplying each element of mass by the square of its distance from the axis. But with regard to a plane or point, the moment of inertia is the *sum* of the elements of mass each multiplied by the square of its distance from the given plane or point. There are other compounds, and phrases, in which the word inertia conveys a specific meaning. All, like the above, are defined in the better works on physics.

We gain our first conception of inertia by the attempts that we make to move bodies that are at rest, or to stop those that are in motion. As to the underlying notion of continuity inherent in the idea of inertia, we can hardly say more, philosophically speaking, than, that nothing in the known world is inconsistent with the hypothesis that all changes are really continuous. Indeed if the a priori belief in permanence or continuity had not existed the same laws which are now formulated in terms of this belief might just as well have been formulated without it. In a hypothetical sense continuity may be allowed to be the necessary condition if two appearances are to be classed as appearances of the same thing. Even if bodies are suspended freely, so that fractional forces are negligible, we find that their state of rest or motion cannot be modified without the exercise of a certain amount of muscular force; and by abstracting our own personality in the case, we gradually come to the conception of inertia as a physical property inherent in all bodies. Inertia has been popularly described as a «passive resistance» to change of motion; but this expression is objectionable because it is entirely inaccurate. Freely suspended bodies (that is, bodies that are free from frictional force) cannot be said to «resist» forces that are applied to them. On the contrary, they yield instantly to the smallest force; but a small force, when exerted upon a given body, for a given length of time, does not produce as great a change of motion as would be produced by a large force acting upon the same body for the same length of time. The conception of inertia shades insensibly into that of «mass»; the mass of a given body being proportional (by definition) to the velocity that is communicated to the body by a force of standard intensity, acting upon it for a standard length of time. See MASS; MATTER; MOLECULAR THEORY.

INEZ DE CASTRO. See CASTRO, INEZ DE.

INFALLIBILITY, exemption from the possibility of error. The word is used as applied to arguments, statements, reasoning or the formation of judgments, and does not include impeccability or exemption from the error of sin. The infallibility of the Church as believed by Roman Catholics means that «the Church can neither deceive or be deceived in matters of faith and morals»; and she is limited to the definition of truths already contained in Scripture and tradition. The seat of infallibility rests in the Pope as successor of Saint Peter (Matt. xvi, 18) and in the bishops in communion with the See of Rome, whether dispersed or united in a General Council. In the acts of the Vatican Council, held in Rome in 1870, the following is the text defining the nature of the infallibility of the Pope: «The Roman Pontiff, when he speaks *ex cathedra*, that is to say, when in the exercise of his office of pastor and teacher of all Christians; he, in virtue of his supreme apostolic authority defines that a doctrine on faith and morals is to be held by the whole Church, by the assistance of God promised to him in the person of blessed Peter, has that infallibility with which it was the will of our Divine Redeemer that His Church should be furnished in defining a doctrine on faith or morals, and that therefore these definitions of the Roman Pontiff, of themselves and not through the consent of the Church, are irreformable.» The Greek Church, the Church of England and the Protestant Episcopal Church which is its representative and in communion with it in the United States, believe that infallibility resides in the universal Church in accordance with Christ's promise of the Spirit that should guide His followers unto all truth. Consult Allies, 'See of Saint Peter'; Ballerine, 'De Primatu'; 'De Potestate Summ. Pontif.'

INFAMY and INFAMOUS CRIMES, in common law the first means disqualification from giving legal evidence as a result of having committed the second, the theory being that a person capable of such crimes is incapable of speaking the truth. Both in Great Britain and generally in the United States this disqualification has been abolished by statute, and previous convictions for crime have been considered to affect a person's credibility without impairing his legal capacity to give evidence. Infamous crimes are strictly those which entailed punishments. The fifth amendment to the Federal Constitution speaks of «capital or otherwise infamous crime» and we read in 2 Dane, Abridgment, 569, 570: «Punishments clearly infamous are death, gallows, pillory, branding, whipping, confinement to hard labor and cropping.» Infamous punishments include imprisonment in State prison or penitentiary with or without hard labor, and crimes which entail such punishments are undoubtedly to be considered infamous crimes, in the sense implied in the fifth amendment to the Constitution.

INFANCY. The term infancy is used variously by different writers to include a shorter or longer period of the earliest stage of human

existence. By most writers it is limited to the first 12 or 14 months, extending to the time when the baby begins to walk and to talk, and so is synonymous with a "babe in arms"; many medical authors would make it include the whole period of the first dentition, or up to about two and a half years. The characteristics of the period are utter helplessness, rapid growth of body, gradual development of muscular functions and great impressibility of the nervous system. In mankind this helplessness is more marked and the period of dependence is longer than in any other of the higher animals. It has been pointed out by John Fiske that the present elevation of man above other animals is due largely if not entirely to this lengthened period of plasticity,—to his prolonged immaturity. Man is born with only a few of the lowest vegetative capacities fully developed, such as digestion, respiration and circulation; the muscular and nervous functions are latent and only gradually develop; while the higher functions of the mind go on evolving until the fifth decade of life. A long infancy or period of immaturity means a great capacity for development.

Birth and Heredity.— The infant comes into the world with a fixed sum total of vital force, along with certain hereditary tendencies in development toward health and, perhaps, toward disease. These hereditary tendencies are all modified by the physical, social, intellectual and moral status of the child's family and surroundings: in a word, they are vastly influenced by the child's environment. Heredity was formerly regarded as the most important factor in the child's life; but heredity is really only one of three great factors,—the others being the nutrition of the child, and his physical, intellectual and moral environment. During the plastic years of infancy, childhood and adolescence, a bad heredity can frequently be overcome by proper management; on the other hand, the capital of a good heredity can be squandered. Nature always tends toward the normal or healthy, so that there is always the possibility for a bad heredity to be obliterated if only the natural tendency is assisted. More then depends on the nutrition and environment of the infant than upon its heredity.

Nutrition: Breast-Feeding.— The best method of nourishing the infant is nature's way —to have it nursed by the mother. But for various reasons this is often impossible. Modern life —and especially city life —has in some way rendered a certain proportion of women incapable of producing breast milk for their offspring. Every encouragement, however, should be given to the young mother; for it frequently happens that a second baby can be successfully nursed after failure with the first. Again, in not a few instances, the infant does not thrive upon the breast-milk, even though it may be abundant. In both these classes of cases some form of artificial or substitute feeding is a necessity. Good wet nurses are so difficult to procure in the United States that artificial feeding is generally preferable unless the baby is premature or feeble and failing: then the services of a wet nurse may be needed to save the infant's life.

Artificial or Substitute Feeding.— The best available substitute for human milk is an adaptation of fresh, clean unadulterated cow's milk. The milk should be diluted and otherwise modified to suit the infant's feeble digestive powers, and it should be given preferably, without being scalded or sterilized. In summer, or when there is any doubt as to the freshness of the milk, the cleanliness of the dairy or the careful handling of the milk, "Pasteurization," or heating the food to a temperature of 155° F. is advisable. Details as to milk modification and Pasteurization can be found in any book on "Infant Feeding." Ready-made infant foods,— the canned or bottled proprietary foods —do not contain the right ingredients for properly nourishing the infant, and their prolonged exclusive use is nearly always followed by some form of malnutrition —especially scurvy and rickets. These proprietary foods contain large proportions of sugar or starch, and so make fat babies, but such infants are generally pale, have feeble powers of resistance, and are prone to succumb to disease of the lungs or of the digestive tract. When the prepared infant foods are used as additions to milk they are less objectionable, and may at times be of advantage.

Weight and Development.— The infant that has been properly nourished before birth and is born at full term weighs on the average about seven and a half pounds —boys being somewhat heavier than girls.

During the first few days, while the nourishment from the mother is insufficient, the baby regularly loses from six to eight ounces; but it soon begins to gain, and if the nutrition is normal and the infant remains well, there will be a steady increase in weight throughout the first two years. The gain during the first year is more regular however, as well as more rapid than that during the second year. During the first three months the increase in weight each week is about half a pound: from the third to the sixth month the weekly gain is somewhat less, from four to six ounces: from the sixth to the ninth month about four ounces, and after the ninth month a little more, usually a weekly increase in weight of from four to six or even eight ounces. By the end of the fifth month the baby that has been perfectly well and is being properly nourished should have doubled its birth-weight and weigh about 15 pounds: at the end of the 15th month it should weigh three times its weight at birth. In many instances the baby will treble its original weight by the end of the first year; but 21 pounds may be considered the average weight for the end of the 12th month. Infants that were very large at birth do not increase so rapidly; while small or premature babies are apt to make a gain that is greater in proportion to their original weight. "Hand-fed" or "bottle" babies should weigh on the average about the same as breast-fed babies,—provided that they have had no disturbance of their digestion; the food must, however, have been perfectly adapted to the infant, and this is often a very difficult problem.

Height and Other Measurements.—At birth the length of the average baby is about 20 inches; during the first six months there is an increase of four to six inches, and during the second six months from three to four inches more; by the end of the second year the height is 32½ inches, a growth of over a foot since birth. By the end of the third year the stature

is one-half of the adult height. The head grows very rapidly during infancy and early childhood. The circumference of the head at birth is from 13 to 14½ inches; by the end of the sixth month it is 16½ or 17 inches; at the end of the first year 18 inches and at the end of the second year it is 19 inches. By seven or eight years the circumference of the head almost equals the adult size of 21 inches. This is visible evidence that during the first months and years of life the brain is increasing in volume more rapidly than any other organ in the body,—the head or brain-box expanding to conform to the enlarging brain. The soft spot or "fontanel" usually closes between the 15th and the 20th months. The chest is smaller than the head at birth (13 inches), but its circumference increases rapidly, so that at 18 months that of the chest and the head are equal. After this the chest grows steadily but gradually until puberty, when there is a very rapid increase for four or five years. Aside from the regular increase in weight and measurement, the healthy infant shows other signs of well-being. The baby's flesh is firm, and the skin is satiny and elastic: the color is pink, and the body and extremities are well rounded. Very fat babies are not necessarily stronger or healthier than those that weigh less: as has already been noted they are apt to be pale, flabby and of weak resistance to disease. The healthy baby is happy and playful when awake, and sleeps from 16 to 20 hours out of the 24,—longer the younger the baby. It is desirable that the growing child have a nap during the day up to the time when kindergarten work is begun; with nervous or poorly nourished children the practice should be continued until the seventh or eighth year.

Muscular and Mental Development.—These begin with the entrance of the infant into the world, but are slow in unfolding. At first the grosser movements performed by the muscles working over the larger joints, next more complex movements, and during later childhood and early adolescence the finer movements requiring nice adjustment and delicate co-ordination. Hence it is that occupations or accomplishments requiring great manual dexterity, such as violin or piano-playing, should be taken up early,—"before the hand gets stiff," as the phrase is. The first movements are those of the legs, arms and neck: they are not purposeful but merely reflex. By the sixth week the infant can hold up its head, when the back is supported, but very unsteadily until about three months old. At some time in the third or fourth month the infant makes its first voluntary movement, grasping at some object in the range of vision. Within a month or two later the baby can co-ordinate the muscles of the eyes, arm and hand sufficiently to take firm hold. Sitting alone is an accomplishment of the seventh or eighth month, and creeping also begins at about this time, if the baby is ever to creep at all. During the eighth or ninth month the baby begins to stand, having made the attempt for many weeks before; at ten or eleven months the infant can stand alone, and shortly after the twelfth month the first tottering steps are taken. It is some months before the baby is secure upon the feet, the maintenance of the equilibrium requiring nice control of many groups of muscles. Healthy infants differ greatly as to the time when they can walk alone, some walking at as early as ten months, while others may not walk until 18 months. Very fat babies walk late, but, in some instances, an excess of caution seems to be a factor. If a child is far behind in performing any of these muscular functions a physician should be consulted so that careful examintion may be made for signs of rickets or of disease of the brain or of the spinal cord.

Development of Special Senses.—For the first few days the newly-born infant avoids the light, and for many weeks cannot endure a direct bright light. Perception of light soon develops, the color first attracting attention being red. Clear perception of objects comes during the fifth month. Hearing is in abeyance for several days, a baby at birth being practically deaf; but after a week or ten days this function begins, and later hearing becomes very acute, the infant being able to recognize the mother's voice or a footstep at about three months. Loud sounds cause the baby actual pain, so severe are their impressions on the delicate auditory apparatus. The sense of touch (contact) is early developed, especially in the tongue and lips; but sensitiveness to pain is very dull during infancy. Heat and cold are recognized from an early period, the variation of a few degrees in the temperature of the food causing the baby to refuse it. Taste and smell also are present at birth, taste being very discriminating.

Development of Speech.—Speech is very closely related to the higher functions of the brain, and is therefore the last of the simple functions to develop. Usually a baby begins to say "Mamma" and "Papa," with clear knowledge of the meaning, toward the end of the first year. Next names of objects and persons are learned and soon two words are put together. Then verbs are used, and about the end of the second year little sentences are made. Pronouns are regularly the last of all the parts of speech to be used. During the third year speech develops very rapidly, the baby bringing out some new term or expression almost daily. There are great variations in the time when children begin to talk; and for this there are many reasons. Girl's generally talk earlier than boys by two or three months: babies that associate in the nursery with other children talk earlier than only children. If, however, a young child reaches the age of two years without attempting to talk, mental backwardness or organic brain disease is apt to be the cause. Tongue-tie is seldom the cause of backwardness in talking, although it does produce imperfect articulation.

Dentition — Teething.—The first teeth appear about the sixth of seventh month, but a perfectly healthy baby may have no teeth until 10 or 11 months old, or on the other hand may cut the first tooth at four months. The regular order is as follows: lower central incisors, upper central incisors, upper lateral incisors, lower lateral incisors — each pair coming at intervals of three to six weeks: at about the fourteenth month the front double teeth (anterior molars) appear in the two jaws, and four or five months later the canines, known popularly as the "eye and stomach teeth." Finally, the last four molars appear sometime between the twenty-fourth and the thirtieth month, and

these complete the 20 teeth of the first dentition. Teething babies are apt to be fretful, they have a reduced resistance against disease, and they are prone to slight disturbances of digestion. To attribute most of the ills of infancy to the process of teething is a great mistake; usually some other and better cause for the disturbance can be found if the baby is carefully examined. During the time when the successive pairs of teeth are coming through the gums, the usual food should be largely diluted, so as to prevent any serious indigestion.

Fever.— Sudden high temperature is readily produced in young children by slight causes, inasmuch as the heat-regulating centre in the brain is but poorly developed. Again, the temperature in disease is erratic and is apt to be higher than in adults suffering from the same ailment. Only persistent high temperature need cause anxiety.

Convulsions.— A characteristic of infancy is the easy excitability of the motor side of the nervous system. Hence convulsions or spasms are much more frequent and less serious than in adults. The immediate cause of the motor explosion may be an overloaded stomach, fright or mental excitement, or the fever of an oncoming disease. Severe earache, intestinal worms or a paroxysm of whooping cough may also serve as an exciting cause. Underlying or predisposing causes are a nervous heredity, malnutrition, or rickets; or there may be organic disease of the brain or the kidneys. The spasm usually begins with a turning of the eyes to one side and twitchings or grimaces of the face; there may be frothing at the mouth; then the arms and legs are rapidly contracted and relaxed; later the body stiffens out, the breathing becomes noisy and labored, the face, — especially the lips — becomes livid. Shortly afterward the body relaxes, the breathing becomes easy, and spasm ceases for the time being — having lasted anywhere from five to thirty minutes. Until the physician arrives certain simple measures are of value. The infant should be undressed, wholly or partially, and put into a warm bath (not warmer than 105° F.) to which a handful of mustard flour has been added, and the baby should be rubbed all over while in the tub for about five minutes. Then remove from the bath and lay between blankets, putting a warm bottle at the feet and an ice cap or cold compress on the head. If the baby can swallow, a full dose of castor oil should be given. Most convulsions are due to the presence of decomposing food-remains in the alimentary tract, and the spasms usually cease when the stomach and bowels have been thoroughly evacuated.

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INFANT, *in law.* By the common law persons come to majority at the age of 21 years, until which time they are called in law *infants,* but by common usage in the United States the word minor prevails. This rule is practically universal, by statute, for males, but many States fix the age at 18 years for females. Infants cannot, in general, bind themselves by contracts, as they are supposed not to have sufficient discretion and ability for this purpose. But this is their privilege, and their contracts are accordingly held in general not to be void, but only voidable at their election; and they may elect to avoid their contracts in relation to personal property either after or during their minority, except such as they may have entered into for necessaries suited to their condition in life, but they cannot confirm any contracts so as to be bound by them until their majority. Contracts affecting realty are usually held not to be avoidable by infants until after their majority. Infants may possess property, but it must be under the management and control of a guardian. They have not the right of citizens as to voting and discharging other political functions. But in regard to crimes and punishments, and trespasses and private wrongs, their conduct is regulated by the same laws as that of the other members of the community, in case of their being of sufficient age and discretion to understand their duties and obligations. And for this purpose no general limit can be assigned, as some children are much more intelligent than others of the same age; and it will again depend, in some degree, upon the nature of the offense committed, or the wrong done, whether a child of any given age can be considered legally guilty of it, since some offenses and wrongs can be more easily understood to be such than others. The law, in general, has a tender regard to youth, and does not permit them to be convicted and punished for offenses and trespasses unless it appears clearly that they have sufficient knowledge and discretion to distinguish them to be such. There are exceptions to the incapacities of minors as to contracting, and these exceptions are made for their benefit. Thus an infant not sufficiently furnished with necessary clothes, food, lodging, medical services, or instruction, by his parent or guardian, and not being under the immediate superintendence of the parent or guardian, may make a valid contract, in respect to those subjects, and such contract may be enforced against him. However, an infant who has contracted for and received necessaries is liable for their reasonable value only, and not necessarily for the agreed price. Infants require the consent of parents or guardians to marry. The jurisdiction in respect to infants is generally vested in either probate or orphans' courts. These courts appoint guardians to take charge of the property of infants, and, in case of the decease of the father, to take charge of their persons; but during the life of the father he ordinarily has the guardianship and control of the persons of his children until they are 21 years of age.

Blackstone thus treats the subject infant: "Infants have various privileges, and various disabilities; but their very disabilities are privileges, in order to secure them from hurting themselves by their own improvident acts. An infant cannot be sued but under the protection and joining the name of his guardian, for he is to defend him against all attacks as well by law as otherwise; but he may sue either by his guardian, or by his prochein ami, or alone for wages in the county courts. In criminal cases an infant of the age of 14 years may be capitally punished, but under the age of seven he cannot. The period between 7 and 14 is subject to much uncertainty; for the infant shall,

generally speaking, be judged *prima facie* innocent; yet if he was *doli capax*, and could discern between good and evil at the time of the offense committed, he may be convicted, and undergo judgment and execution of death, though he has not attained to years of puberty or discretion."

INFANT JESUS, Daughters of the Congregation of the, is an order in the Roman Catholic Church. It owes its origin to Anna Maroni a native of Lucca, who having come to Rome entirely destitute, succeeded by her industry in securing a competency. In more advanced years, her charitable feelings prompted her to establish an institution where poor girls should be instructed in such work as would enable them to earn a livelihood. The clergy approved of her plan, and afforded her much assistance, and it was finally established as a regular institution. In 1673 Pope Clement X acknowledged the existence of the society, gave it by-laws, and endowed it with sundry privileges, under the appellation of "Daughters of the Infant Jesus." The number of the "Daughters" allotted to each convent was fixed at 33, in commemoration of the number of years Jesus lived upon earth. The novitiate lasts three years; the sisters make vows of poverty, chastity and obedience. Such as may wish to leave the convent are allowed to do so before taking the vows, but in that case, they are to leave to the convent all they brought to it at their admission. Prayers and fasts are strictly enforced. The regular habit of the order consists of a wide, dark brown dress, and a white hood.

INFANT MORTALITY. See VITAL STATISTICS.

INFANT SCHOOL. See EDUCATION; FROEBEL; KINDERGARTEN.

INFANTE, José Miguel, Chilean statesman: b. Santiago de Chile, 1778; d. 1844. He took part in the War of Independence in 1810 and subsequently served as president of the Junta. 1817 he was dispatched as special envoy to Argentina. He always acted from pure and disinterested motives, refusing public office whenever he felt that conditions were safe without him, and opposing the granting of arbitrary authority to individuals. He founded *El Valdiviano Federal* in 1821 and remained its editor until his death. Many progressive measures were sponsored by him, notably the emancipation of the slaves and the founding of the Chilean educational system. He was offered the post of Chief Justice of the Supreme Court in 1843 but declined to serve.

INFANTE, Spanish title of all princes of the blood royal with the exception of the heir to the throne, who is styled El Principe de las Asturias. The title is also bestowed on consorts of royal princesses and was used similarly in Portugal before that country became a republic.

INFANTICIDE, the murder of a child born alive, is a crime of frequent occurrence. The main cause of the crime is shame, induced by a dread of the social disgrace attaching to mothers of illegitimate children; though in many instances infanticide has been the result of violence produced by puerperal insanity. The morbid disposition to kill the newly born has also been observed in certain of the lower animals. The sanctity of human life, from its beginning to its close, is a maxim of modern civilization, and the law treats as a murderer whoever wilfully terminates it at any stage. According to the law of England every woman who employs means to procure criminal abortion is guilty of felony, and liable to penal servitude for life, or not less than three years; and severe penalties are inflicted on those who aid women to procure miscarriage. The concealment of birth is a misdemeanor, and may be punished with imprisonment for two years. In the United States, when a child's death is occasioned by an illegal act, such act is considered either murder or manslaughter according to the circumstances. The crime, however, is rarely punished, and in large cities many cases occur each year which are never reported to the authorities.

Infanticide was prevalent in Greece and Rome. In modern times many barbarous peoples are guilty of wholesale child-murder. Among some of the Pacific Islanders and aboriginal Australians there is a great destruction of infant life. The Hindus used to destroy female children without compunction. In China infanticide is said to be very common. See ABORTION.

INFANTILE PARALYSIS. See POLIOMYELITIS.

INFANTRY, name given to soldiery serving on foot and using small arms and equipped for marching and fighting on foot. Modern combat demands the highest order of training, discipline, leadership and morale on the part of the infantry. Modern war requires but one kind of infantry—good infantry—and this must take the offensive to gain decisive results. In the local combats which make up the general battle the better endurance, use of ground, fire efficiency, discipline and training will win. It is the duty of the infantry to win the local successes which enable the commanding general to win the battle, and it must have the tenacity to hold every advantage gained, the individual and collective skill needed to master the enemy's fire, the determination to close with the enemy in attack, and to meet him with the bayonet in defense. It must be trained to bear the heaviest burdens and losses, both of combat and march.

Among the ancient nations of Europe, infantry or foot soldiers constituted the chief strength of armies. In the days of the Grecian and Roman states, battles were won mainly by the force and discipline of the phalanges and legions, and the number of the infantry in the field far exceeded that of the cavalry. The cavalry were then, as at present employed chiefly in protecting the wings of the army, and in completing a victory gained by the infantry. The ancient Franks, when they left the forests of Germany, were accustomed to march and fight on foot; and they persevered in this practice even after they had obtained possession of the country of the Gauls, which abounded with horses. But soon after the time of Charlemagne, institutions of chivalry were generally adopted in the kingdoms of Europe. These led to frequent exhibitions of martial exercises on horseback in presence of the sovereigns and assembled nobles; and the interest inspired by the achievements of the knights on

those occasions was naturally followed by a high regard for that order of men. By degrees the cavalry, which was composed of persons possessing rank and property, and completely armed, acquired the reputation of being the principal arm, while the foot-soldiers, badly armed and disciplined, were held in comparatively small estimation. This continued 400 years, and although war was the principal occupation of mankind, military science fell into neglect. But rulers were forced by the power of feudalism to make an alliance with the despised class of foot-soldiers, and in 1214 we find that some of the German infantry was recognized to be "very good and trained to fight even against cavalry." The cavalry of France was routed at Courtrai by the infantry during the next century, and the Austrians suffered defeat by the efficient work of the Swiss pike at Morgarten (1315), Sempach (1386) and Nafels (1388). At Cressy and Poictiers (1346–56), the knights of England dismounted to fight beside the successful infantry. The principal weapons of the infantry before the invention of gunpowder were longbows, halberds, cross-bows, spiked clubs, axes, pikes, straight-swords, shields, corselets, mail-jackets, helmets and partisans. In the 16th century, however, these weapons were replaced by firearms, and in the 18th century, the musket was in general use. It became customary during the Thirty Years' War to form battalions of infantry composed of 500 men, which were massed into dense columns during battle in spite of the deadly effect of the enemy's artillery. The absurdity of this formation was first exposed by Gustavus Adolphus, who recognizing the destructiveness of firearms, arranged his battalions with a view to increasing the effectiveness of the fire of his troops, while avoiding exposure to that from the enemy. His tactics were so successful at Breitenfeld and Lutzen (1631–32) that they were soon afterward universally adopted. Frederick the Great made many improvements till then comparatively unknown. The rapidity with which his infantry troops performed their evolutions during battle contributed largely toward his famous victories in the Seven Years' War. In fact the Prussian infantry have ever since his time served as models for other European countries. The superiority of this arm consists in the troops being able to act on ground which cavalry cannot, and it is obvious that the latter must be nearly useless in the attack on fortified towns.

Co-operation with Other Arms.— The attack of intrenchments is hopeless without the aid of artillery. With reference to the amount of artillery to be used, the opinion is general that there cannot be too much. Artillery and infantry without modern equipment exist only in name.

The infantry should designate objectives for the artillery, since it is this arm that appreciates the danger points and knows definitely where fire should be directed. The eyes of the artillery are the observers, who should be with the infantry in the trenches. The artillery should place the guns where it pleases but the commander and the observers, the brain and the eyes, must preserve the most intimate contact with the infantry. The attacking infantry requires two things: (1) To know where to go and to see how to go; (2) to receive the greatest possible assistance from the artillery before, during and after the assault. The most dangerous period of all for the attackers is after the position is taken when the enemy concentrates his fire upon it and makes a counter assault. Surprise action by concentrated artillery fire is to be sought. The maximum effect in the shortest period of time should be striven for, as this naturally renders the surprise more complete.

It is a grave mistake to try to fix in advance the time of duration of the artillery fire. The fire should continue until in the opinion of the commander of the attacking force, it has accomplished its purpose. When the infantry advances to the assault the artillery protects it with a curtain of fire to the front and both flanks.

To guarantee a close co-operation between the artillery and its own infantry, artillery officers should accompany the advanced infantry lines. The infantry commander has not always the time to communicate to the artillery observer everything that is wanted from the artillery. The observer, by reason of his technical knowledge, can be of great assistance in advising the infantry commander as to the best methods to pursue to bring about effective artillery support. But in order to carry out a mission of this kind, the observer should have a thorough knowledge of the details of the infantry combat to appreciate what is happening around him.

Infantry Machine Guns.— Three machine gun platoons form a part of each regiment of French infantry. In order to avoid premature exposure to hostile fire the platoon advances under cover to a position for unpacking, from which the guns, after being prepared for action, are carried forward to a position in readiness. Great care in reconnoitering and taking up the firing position is enjoined, in order that the position of the guns may not be disclosed.

The regulations recognize three methods of fire: *Distributed fire,* the normal method, which calls for sweeping the designated target from flank to flank with 100 rounds once or twice; *continuous fire,* in which the fire continues until interrupted from time to time by the chief of piece as the target disappears momentarily; and *unit fire,* which is delivered by using the gun substantially as a rifle, thus stimulating rifle fire and preventing the premature disclosure of the presence of a machine gun.

Normally only one of the two guns of the platoon is fired. Firing with both guns at the same time is exceptional and is justified only against a particularly threatening portion of the hostile force; that is, against a deep, broad and only momentarily visible target.

Machine guns are a valuable aid to infantry engaged at close ranges. They are to be regarded as a movable fire reserve. In order that they may be concentrated at the time and place at which fire superiority becomes essential, they should not be put into action prematurely.

The machine gun is valuable mainly at short and mid ranges, and becomes especially effective when it may be used in enfilading a line or in rolling up a flank. Its value is comparatively small against a target of little depth or a line with great intervals.

Machine guns are placed to the best ad-

vantage immediately in rear of a flank or in rear of intervals in the most advanced line. To fire over infantry or other troops by way of supporting them is to be thought of only when the terrain renders possible two or more lines of fire, one above the other.

Infantry Attack.— In the operations before Verdun, the German army corps nearly always attacked with their divisions side by side. Only in exceptional cases, as when the extent or importance of the zone assigned to a single corps permitted only the employment of a single division, did the other remain behind in support of the first.

The front of the zone assigned to a division of three regiments (7,200 rifles) varies between 1,000 and 2,500 meters, according to the importance and number of the successive objectives assigned to it.

In respect of the disposition for attack of its units, if the zone of action be narrow and the objective varied, the division places two regiments in the first line, side by side, with the third in reserve. But if the zone be wide, with only one objective, then the three regiments form in one line, separated by intervals varying with the nature of the ground.

Whatever be the disposition taken by the division, the regiments place in general one battalion in the first line and keep two in reserve, echeloned in depth at distances depending on the nature of the ground. The more advanced of the two reserve battalions is always in readiness to advance, either to support the attack against the first objective, or to carry it on beyond. The other reserve battalion is at ease; its duty is, at the right moment, to relieve the exhausted units of the first line.

The German infantry in general turns out its battalions in two lines. The first is almost invariably composed of two companies side by side; these deploy for the assault either in the most advanced trench or in the last shelter. The second line remains in the supporting trenches either in shelters or under some covering obstacle.

The procedure of attack is always that of successive lines of men, and rests upon the following general principles:

1. To each line of attack is always assigned a limited and well-defined objective, no wider than the front of attack, and never deeper than the distance between two successive lines of trenches.

2. The assaults open only after the artillery has thoroughly swept the trenches and destroyed the obstacles, in order to compel the defense to abandon all idea of resistance.

3. The assault proper is preceded by thorough reconnaissance of the objective sought, in order to make sure that the artillery has produced the desired effect. These reconnaissances in reality constitute the first wave of the assault; the succeeding waves are held back until the first shall have made progress.

In respect of details, the various methods of assault are more or less of the following pattern: the successive waves are three, separated by some 20 or 30 paces. The first of these makes the reconnaissance mentioned above, it is formed by one or two squads from each platoon, is accompanied by scouts carrying tools, and by grenadiers, and is deployed at wide intervals. The second wave consists of a dense line of rifles, and comprises the principal part of each platoon. This line's duty is to occupy the trenches. Finally, the third is composed of the remainders of each platoon, and constitutes a new echelon, whose business it is to fill the gaps that may be produced. With it goes a reserve of munitions and materials in order to hold the captured trenches.

Infantry Against Cavalry.—A cavalry charge can accomplish little against infantry, even in inferior numbers, unless the latter are surprised, become panic-stricken, run away, or cannot use their rifles. A charge from the front is easily checked by a well-directed and sustained fire.

If the charge is directed against the flank of the firing line, the supports, reserves, or machine guns should stop it. If this disposition is impracticable, part of the line must meet the charge by a timely change of front. If the cavalry line passes through the firing line, the latter will be little damaged if the men retain their presence of mind. They should be on the watch for succeeding cavalry lines and leave those that have passed through to friendly troops in rear.

In a mêlée, the infantryman with his bayonet has at least an even chance with the cavalryman, but the main dependence of infantry is rifle fire. Any formation is suitable that permits the free use of the necessary number of rifles. Ordinarily there will be no time to change or set sights. Fire at will at battle sight should be used, whatever the range may be. It will usually be unwise to open fire at long ranges.

An infantry column that encounters cavalry should deploy at once. If attacked from the head or rear of the column, and if time is pressing, it may form a succession of skirmish lines. Infantry, by deploying 50 or 100 yards in rear of an obstacle, may check cavalry and hold it under fire beyond effective pistol range. In any situation, to try to escape the issue by running is the worst and most dangerous course the infantry can adopt.

In attacking dismounted cavalry, infantry should close rapidly and endeavor to prevent remounting. Infantry which adopts this course will not be seriously checked by delaying cavalry. Every effort should be made to locate and open fire on the led horses.

Infantry Against Artillery.—A frontal attack against artillery has little chance of succeeding unless it can be started from cover at comparatively short range. Beyond short range, the frontal fire of infantry has little effect against the artillery personnel because of their protective shields. Machine guns, because their cone of fire is more compact, will have greater effect, but on the other hand they will have fewer opportunities and they are limited to fire attack only. As a rule, one's own artillery is the best weapon against hostile artillery.

Artillery attacked in flank by infantry can be severely damaged. Oblique or flank fire will begin to have decisive effect when delivered at effective range from a point to one side of the artillery's line of fire and distant from it by about half the range. Artillery is better protected on the side of the caisson.

Guns out of ammunition, but otherwise secure against infantry attack, may be immobilized by fire which will prevent their withdrawal, or by locating and driving off their limbers. Or

they may be kept out of action by fire which will prevent the receipt of ammunition.

Artillery when limbered is helpless against infantry fire. If caught at effective range while coming into action or while limbering, artillery can be severely punished by infantry fire. In attacking artillery that is trying to escape the wheel horses are the best targets.

Trench Warfare.— In the present warfare, trenches play a most important rôle, and in order to obtain success, it is necessary to employ only infantry which is morally fit and thoroughly trained. The two factors, "*fire action and advance*" have been recognized by all belligerents as not having the same meaning as heretofore. Success will not be brought about by these two factors alone, on account of the extensive use of obstacles. In order to win, the infantry attack must be preceded and must be accompanied by powerful means of destruction, such as fire action in all of its forms, grenades, mines, aerial torpedoes, asphyxiating gases and burning liquids. During the *advance*, the attacking lines are confronted with three kinds of powerful obstacles: barbed wire entanglements, machine guns and the artillery curtain of fire.

The French tactical unit is the infantry division. Every military movement demands that the division be complete in itself. It should have heavy artillery, field artillery and trench artillery. Under the classification of trench artillery are included cannon of less than 7.5 mm. calibre, or those having a shorter range than the present field pieces.

No definite rules can be laid down for trench warfare. New lessons are being taught, and each belligerent is constantly changing his methods of warfare, at least in the manner of execution. There is no greater mistake than to undertake attacks, the necessity of which has not been clearly demonstrated.

The attack on an enemy's trench should never be undertaken except after a careful study of the situation; but, once launched, the objective must be gained, with the minimum amount of losses and with this one idea in mind, of holding the ground captured. The assault must be of short duration. It cannot be so, unless the attack has been well prepared, well arranged, and every detail attended to beforehand. Between any advantage that may be gained through surprise, which is not possible in trench warfare, and a careful preparation by the supporting artillery just before the attack, the latter method is preferred by the infantryman. To attack blindly a line of trenches is a thing of the past. To believe that if the difficulties of an attack are known to the infantry, its offensive spirit is reduced, is nothing but a fallacy. See ARTILLERY; CAVALRY.

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INFANTRY, Mounted, soldiers trained to act as foot and cavalry soldiers and usually equipped with rifles from which fact they are frequently designated mounted riflemen. Their supreme advantage over ordinary infantry consists in their greater mobility. This arm is but little known at present, but was favored by many expert soldiers during the American Civil War and the following decades. In the struggle between the North and South the so-called cavalry was little better than mounted infantry, all their training being along the lines laid down for the latter. Mounted infantry appear to have been first introduced by Marshal de Brissac in 1600. In 1672 they were introduced into the British army. Napoleon I and his generals appreciated the possibilities of this arm. In the 19th century the value of mounted infantry for outpost duty, for covering retreats, for sieging, holding or destroying bridges, and for other works of destruction, such as removing telegraphs, etc., were generally recognized. In this way this arm rendered efficient service in the Civil War. The chief action of such troops must always be as infantry, the horses of the dismounted men being held by their comrades. Mounted infantry differ essentially from cavalry, the latter depending little or not at all on fire-arms, but almost entirely on lance or sabre and the shock of the charge. Mounted infantry on the other hand, depend on the rifle and their mounts are merely intended to give them a maximum degree of mobility. The introduction of aircraft in modern armies has dispensed in great part with mounted troops for purposes of reconnaissance, and motor transport is being increasingly used for the rapid transfer of troops to points where the line is hard pressed. Modern trench warfare, also, has to a very great extent eliminated all mounted troops. It is too early, however, to draw general conclusions from the Great War of 1914–18, in which mounted troops played but a small part after the first few weeks of open fighting.

INFECTION, the introduction of disease-producing micro-organisms in the body. Infection may result in a number of different ways. Micro-organisms may be introduced by means of direct injury. When a person falls and cuts the hand, the bacteria of pus-production or of tetanus may be so introduced, and blood poisoning or tetanus may develop. Many infections come by means of the intestinal tract. Thus typhoid is commonly obtained from milk or drinking-water. The intestinal worms, tapeworm, roundworm, are contracted in this manner, and a number of other parasites, particularly the trichina, may come from infected food taken into the alimentary canal. Infection may also occur by means of the air-passages. The bacillus of tuberculosis is most often taken into the body in this way, and finding suitable soil, it causes the development of the dread disease. The bubonic plague is frequently contracted through the disease-germ entering the air-passages. At the present time it is deemed not unlikely that a number of infectious diseases, notably influenza, diphtheria, scarlet fever, measles, whooping-cough, are contracted through the respiratory tract by infection with the exciting cause. Occasionally direct contact seems necessary for infection, as in gonorrhœa and

syphilis. In malaria, and probably in yellow fever, the active agent that causes the disease is introduced into the body by the bite of an insect, the mosquito. In malaria one particular genus (*Anopheles*) serves as an intermediate host in the developmental history of the parasite, in a manner analogous to the history of the development of a number of the intestinal worms. It is not unlikely that a large number of diseases may be disseminated by the bites of insects of one kind or another. In all the infectious diseases the element of a real, live, and active contagion should never be overlooked. Infectious diseases do not spring out of nothing. There must be some sort of contact in order that a person become infected. A most important part of the treatment of all infectious diseases is the protection of other people by proper care of all one's own excretions during sickness. The doctrine so frequently taught by some that sickness is ignorance is an important half-truth. But for the ignorance of people concerning the proper care of those afflicted with infectious diseases with reference to the protection of others, measles, diphtheria, scarlet fever, whooping-cough, typhoid fever, consumption, and a number of other maladies would be entirely eradicated from civilized communities.

INFERENCE, the mental process of deriving a new judgment from certain premises or assumptions. It is a familiar fact that the mind passes naturally from given facts to more or less assured conclusions based upon them, as when we expect that rain will follow a change in the appearance of the sky. When such mental transitions become explicit so as to be susceptible of being arranged as a series of propositions, we have inference. Inference is more or less experimental, and therefore subject to test by certain rules with regard to its correctness. See DEDUCTION; FALLACY; INDUCTION.

INFERNO. See DIVINE COMEDY, THE.

INFIDEL, in modern parlance, one who deliberately rejects the Christian faith after obtaining knowledge of it. In former times a man might be an infidel who had never heard of Christianity. *Infidelis* in ecclesiastical language means "unbelieving," and is applied to unevangelized heathen as well as doubters and apostates. Thus in the Roman Catholic Church a bishop *in partibus infidelium* merely means a bishop whose diocese is set in heathen countries.

INFINITE SERIES. See SERIES.

INFINITESIMAL CALCULUS. See CALCULUS, INFINITESIMAL.

INFINITIVE, the indefinite mode in which the verb is represented without a subject. As the verb expresses an action, or a state, it generally belongs to a subject whose action or state is expressed; but if we wish to express the mere idea of this action or state we use the infinitive, which, therefore, in many languages is employed without further chance as a substantive — for instance, in Greek and German — only preceded by the neuter article; but as the verb expresses an action or state under certain conditions of time, the infinitive can also express the action or state in the present, past, or future, though these conditions are not expressed in all languages by peculiar forms. Some languages express it by some grammatical contrivance, as is the case in English, where it is denoted by *to* prefixed to the general uninflected form of the verb, as *to love* = Latin *amare*; *to have loved* = Latin *amavisse*. The infinitive may be regarded as the point of transition from a verb to a substantive, and is often used as the subject of a proposition.

INFINITY, a notion which has assumed the most varied forms, characterized by few common characteristics except the transcendence of our customary notions of boundedness and limit. The chief types of infinitude which come to the attention of the mathematician and philosopher are cardinal infinitude, ordinal infinitude, the infinity of measurement, the ∞ of algebra, the infinite regions of geometry and the infinite of metaphysics.

Cardinal infinitude pertains to assemblages and only to assemblages. An assemblage is finite if it can be exhausted by taking member after member from it. It is what is called reflexive if it can be paired off in a one-one manner with a class derived from it by the removal of one term. Whether all non-finite classes are reflexive is not known, as all supposed demonstrations of this statement rest in the insecure basis of Zermdo's axiom. (See ASSEMBLAGES, GENERAL THEORY OF). The set of all classes which can be paired off in a one-one manner with a given class or assemblage is known as a cardinal number. The cardinal numbers of reflective classes are known as transfinite cardinal numbers. Reflective classes are perfectly definite and bounded, though their manner of limitation is not susceptible of being based on an enumeration, as is the case with finite classes.

Ordinal infinitude is a property of well-ordered series. A series is an order which establishes a definite and unique precedence between any two terms which it concerns, and which is such that if it makes a precede b and b precede c. it makes a precede c. A series is well ordered if every series generated by an operation included in its ordering operation has a first term. A well ordered series is infinite if it contains a cardinally infinite number of terms. Two well ordered series are ordinarily similar if their terms can be put in a one-one correspondence in such a manner that corresponding terms always bear the same relation of precedence or succession to corresponding terms. An ordinal number is the set of all well ordered series similar to a given series. It is transfinite or infinite if it is the number of an infinite series.

Infinitude enters into a system of measurement in two different ways: as infinitude of subdivision and as infinitude of distance. A scale of measurement is a system of entities such that every pair has a corresponding real number, which is regarded as the distance separating the members of the pair. The infinite divisibility of a distance is the fact that the distance can be regarded as the sum of a chain of distances stretching from one point to the other, and of as small a magnitude as may be desired. This is preconditioned by the fact that between every two real numbers there lies another real number. The infinite extent of a system of measurement consists in the fact that starting from any point it is possible to

find another point removed from it by a distance of arbitrarily great magnitude.

Strictly speaking, the symbol ∞ has no meaning except in some such context as $f(\infty)$. $f(\infty)$ is an abbreviation for the limit of $f(x)$ as $|x|$ increases without limit, and is only significant when $f(x) - f(x')$ can be made arbitrarily small if $|x|$ and $|x'|$ are only chosen larger than some number A. $f(\infty)$ may also be written $\lim_{x=\infty} f(x)$. $f(+\infty)$ or $\lim_{x=+\infty} f(x)$ means the limit of $f(a+ib)$ where a and b are real and a increases through positive values without limit. $f(-\infty)$ and $\lim_{x=-\infty} f(x)$ have the analogous meaning. $f(+\infty)$ and $f(-\infty)$ may exist when $f(\infty)$ is meaningless.

In ordinary Euclidean geometry parallel pairs of lines and intersecting pairs of lines exhibit many important analogies. The convenient expression of these is rendered possible only by the adjunction to the ordinary points, lines and planes of certain entities, called points, lines and planes at infinity. The method of this adjunction differs in the several mathematical disciplines, for it is dictated by considerations rather of convenience than of logical necessity. In solid projective geometry (q.v.) the adjoined points form a plane cutting every ordinary line or space in one point. This enables the universal law to be formulated, that every two lines intersect in one point, and only in one point. In the theory of the functions of a complex variable (q.v.), on the other hand, it is much more convenient to regard the entire infinite region as a single point, lying on every line.

The infinite of philosophy, corrupted though it is with much undigested and misunderstood mathematics, contains a motive of its own. It is that which lacks external relation, not merely in so far as it is of a spatial, temporal or numerical character, but in any manner at all.

The idea of the infinite is as old as the Ionian philosophy, when Anaximander (610 B.C.) declared that the one in the many, the basis of being in Nature, was *το ἄπειρον*, the infinite. The reality of infinitude has been the source of much controversy, and the tendency of many modern philosophers is to deny it, for there is unquestionably a difficulty in the entrance of the unrelated into the cognitive relation. The discursive nature of knowledge makes us bring every object into a context. This difficulty of finding a context for the infinite is the basis of those antinomies of Kant (q.v.) which concern it. "An infinite number," says Bosanquet, "would be a number which is no particular number, for every particular number is finite. It follows from this that infinite number is unreal." On the other hand F. H. Bradley states the contrary, in the clearest terms, "We may be asked whether Nature is finite, or infinite. . . . if Nature is infinite, we have the absurdity of a something which exists; and still does not exist. For actual existence is, obviously, all finite. But, on the other hand, if Nature is finite, then Nature must have an end, and this again is impossible. For a limit of extension must be relative to an extension beyond. And to fall back on empty space will not help us at all. For this (itself a mere absurdity) repeats the dilemma in an aggravated form. But we cannot escape the conclusion that Nature is infinite. And this will be true not of our physical system alone, but of every other extended world that can possibly exist. . . . Every physical world is, essentially and necessarily, infinite."

It seems as if Aristotle had a clearer and more logical view of infinity, *το ἄπειρον* than many moderns such as Bosanquet. He says, *λείπεται οὶν δυνάμει εἶναι το ἄπειρον*. He means of course, that, with regard to finite human intelligence, the infinite remains unrealized, although logically it could be realized, and of course, when we speak of infinite time, or infinite creative change in nature, we speak of something which potentially exists, but is only gradually becoming actual. In other words, we can transcend whatever relations we choose, so long as we do not transcend Relation.

Professor Royce of Harvard has undertaken the task of vindicating the concept of the actual Infinite against the charge of self-contradiction. He is controverting Mr. F. H. Bradley of Oxford, who while he admits "we cannot escape the conclusion that Nature is infinite," expresses also his belief that such an assertion is a contradiction in terms. Professor Royce attempts to accomplish this vindication by proving the following theses:

1. The true Infinite, both in multitude and in organization, although in one sense endless, and so incapable in that sense of being completely grasped, is in another, and precise sense, something perfectly determinate. Nor is it a mere monotonous repetition of the same, over and over. Each of its determinations has individuality, uniqueness and novelty about its own nature.

2. This determinateness is a character which, indeed, includes and involves the endlessness of an infinite series; but the mere endlessness of the series is not its primary character, but simply a negatively stated result of the self-representative character of the whole system.

3. The endlessness of the series means that by no merely successive process of counting, in God or in man, is its wholeness ever exhausted.

4. In consequence, the whole endless series, in so far as it is a reality, must be present, as a determinate order, but also all at once, to the absolute experience. It is the process of successive counting, as such, that remains, to the end, incomplete, so as to imply that its own possibilities are not yet realized. Hence, the recurrent processes of thought reveal eternal truth about the infinite constitution of real Being,— their everlastingly pursued Other; but themselves,— as mere processes in time — they are not that Other. The true Other is, therefore, that self-representative system of which they are at once portions, imitations and expressions.

5. The Reality is such a self-represented and infinite system. And herein lies the basis of its very union, within itself of the one and the many. For the one purpose of self-representation demands an infinite multiplicity to express it; while no multiplicity is reducible to unity except through processes involving self-representation.

6. Nevertheless, the Real is exclusive as well as inclusive. On the side of its thought the Absolute does conceive a barely possible infinity,

other than the real infinity, a possible world, whose characters, as universal characters, are present to the Absolute, and are known by virtue of the fact the Absolute thinks.

The Royceian theory of the infinite is based on the analogy of cardinal infinitude, and presupposes that there is such a thing as a complete universe. Certain paradoxes discovered by Russell and Burali-Forti tell very strongly against the existence of a complete unity embracing all lesser unities. Royce's work possesses value rather as an account of the potential infinity of a universe capable of indefinite enlargement than as a description of a given, complete infinite. Furthermore, it is clear that systems of much less extent than the Royceian infinite may possess the self-reflecting property of cardinal infinity. (See ASSEMBLAGES, GENERAL THEORY OF). Consult Bosanquet, B., 'Logic' (2d ed., Oxford 1911); Bobzano, 'Paradoxien des Unendlichen' (Leipzig 1851); Bradley, 'Appearance and Reality' (2d ed., New York 1902); Cohn, J., 'Geschichte des Unendlichkeitsproblem in abendländischen Denken bis Kant' (Leipzig 1896); Coutural, 'De l'infini mathématique' (Paris 1896); Geissler, 'Die Grundsätze und das Wesen des Unendlichen in der Mathematik und Philosophie' (Leipzig 1902); Hegel, 'Wissenschaft der Logik' (Berlin 1841); Russell, B. A. W., 'Principles of Mathematics' (Cambridge 1903); Royce, J., 'The World and the Individual' (New York 1900-01); Whitehead, A. N., and Russell, B. A. W., 'Principia Mathematica' (Cambridge 1910).

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INFLAMMATION, a term long used to indicate the phenomena that follow mechanical, chemical or physical injuries to living tissues. These changes have been described for centuries as rubor (redness), calor (heat), dolor (pain) and tumor (swelling), which are the phenomena particularly seen on surface inflammations. At the present time the idea is becoming fixed that inflammation is a conservative process, the phenomena attending nature's effort to rid the tissue of harmful substances. In the normal process of repair of an injury there are changes which closely resemble the milder types of inflammation; but when to a mechanical, chemical or physical injury there is added a growth of micro-organisms, the reply on the part of the body-cells differs from the ordinary repair of injury. The changes witnessed depend upon the strength and kind of invading micro-organism and the particular tissue invaded. The first change is *hyperæmia,* a suffusion of the part with blood from capillary dilatation; following this the liquid part of the blood, the serum, is poured out into the tissues and offers its resisting powers to the poisonous substance. If these measures be insufficient, the white blood-cells called phagocytes congregate in the tissues, destroying the invading organisms, by actually consuming them and neutralizing their toxic products. During this struggle there is more or less death of the cells, called "degeneration"; large masses "slough"; the remnants of the cells and the phagocytes killed form the thick fluid called pus. When an inflammation goes on to the formation of pus, it is spoken of as *purulent* or *suppurative.* Certain poisons cause a peculiar reaction on the part of the tissues, characterized by the formation of new tissue that is unable to carry on the function of the part. This tissue is the same as the connective tissues, and the process is called *productive inflammation.* The poisons that continue to act for a long time are particularly apt to cause this reaction, and the inflammation is called *chronic* because of its permanency. Catarrhal inflammations are these same processes when they occur in mucous membranes; the appearance of these catarrhs, however, is different, owing to the peculiar structure of mucous membrane and to the fact of the epithelial covering offering excellent resistance to invasion. When death of cells occurs they can readily be cast off. Croupous inflammation is the term used to describe those in which there is considerable destruction of the superficial layers of the mucous membrane, which, with the fibrin of the blood, forms a coating or "false membrane" on the surface. Granulation tissue (q.v.) is the name applied to the tissue formed during the repair of an injury. Names are given to certain types of inflammation having a characteristic appearance to the naked eye, but microscopically there is nothing absolutely distinctive in these except their arrangement. Particular examples of these are tubercular and syphilitic inflammations.

The majority of the diseases of the body that we recognize as entities are due to inflammation in some tissue or organ, but the picture depends on the various changes in the functions of different parts of the body. The kind and virulence of the generated poison, together with the reaction on the part of the body-tissues, makes the complete picture that we seek to recognize. The treatment of inflammation is, in large part, the practice of medicine and surgery. Efforts to help the tissues combat against invasion are made with more success as knowledge is gathered of the peculiar invading forces and the natural modes of defense. It is not that we wish to combat the inflammation *per se,* but rather to make it unnecessary by helping it to a successful issue. The actual destruction of the bacteria by drugs introduced into the body is of little use, for they would be apt to cause as much destruction of the body-cells as of the invading cells; but their toxines, which cause the actual damage, we are learning to neutralize by the administration of artificially prepared antitoxins, and by placing the body and its special tissues under the most favorable conditions for developing its natural forces of resistance.

In exposed parts of the body, where antiseptics may be applied, the toxic germs may be killed, and various measures that change the blood-supply may be advantageous. Where death of tissue takes place, nature may require help in its removal. It has long been the rule to evacuate pus wherever it is formed, unless its escape from the tissues is easy.

The treatment of chronic inflammation is entirely different, as this is a process where actual structure is changed beyond repair in many instances. The all-important question is whether the tissue can carry on its proper functions; for, if it can, the body need not suffer. The inflammatory process is arrested in its progress by the removal of the irritating cause, by improving the blood-supply of the part and the vitality of

the body generally. These constitute the measures in general applied for the cure of chronic inflammations, it being understood that the endeavor is to place the tissues in such a condition that they may carry on their functions for the good of the whole organism; and the failure of these measures shows either that they are at fault or that the tissue-change has gone too far. Inflammation of any part is indicated by adding the suffix "itis" to the name of the organ or tissue. (See BRONCHITIS, COLITIS, LARYNGITIS, MENINGITIS), etc. Consult Delafield and Prudden, 'Textbook of Pathology' (9th ed., New York 1911), and Smith, A. H., 'Intermediate Inflammatory Process' (in Transactions of the Association of American Physicians' (ib. 1900).

INFLAMMATION OF THE LUNGS. See PNEUMONIA.

INFLECTION. See INFLEXION.

INFLEXION (Latin, *inflexio*, a bending), that process in grammar which modifies words when placed in relation to other words in a sentence; the act or process of varying the form of words, as by altering the endings or suffixes, so as to express grammatical relationship. It was primarily called bending, evidently because the word was bent to a new shade of meaning. It includes both declining and conjugation, and it is interesting to note that declining also carries out this same idea of bending down the word. In the grammatical term "case," from the Latin *cado*, to fall, there is also the same idea of falling away. Hence, it is well to regard inflexion, in grammar, as the allowing of a word to fall away in a different manner to express some relationship. We say "I love," "he loves," "I am loved" and sometimes "thou lovest." In each case the fundamental idea of love is the same, but the ending on inflexion is bent to agree and harmonize with the noun. In the case of nouns, pronouns and adjectives, we call this process *declension*, and this term was once also used for verbs, but has been displaced by *conjugation*. Nouns and their adjectives should agree in gender, number, person and case. In primitive speech it is obvious that men talked largely by nouns, mainly of one syllable, for the most common things are thus named, viz.: eye, ear, arm, leg, nose, knee, axe, bow, box, tree, hole, sun, moon, etc. Then came longer nouns, as house, elbow, throat, breast, arrow, etc. Then came words of action, the verbs. Qualifying words followed, now known as adjectives and adverbs. Then came joining words, the conjunctions, prepositions and articles. The next step in the development of language was obviously the showing of relationship. As expressions of gender, came "he," "she" and "it"; adding s came to show the plural in most cases; the person, as present or objective, was suggested by "I" and "you"; the case is illustrated by "thou" (nominative), "thine" (possessive), and "thee" (objective).

To conjugate means primarily to join in couples or pairs, but it has been extended in meaning "to state the principal parts of a verb." Conjugation is a connected process of giving the entire series of inflexions of a verb, that is, all its forms in person, number, mode, tense and voice. Many conjugations seem tedious and unnecessarily prolix, but other languages may be more difficult in this respect, as Arabic, in which verbs have 15 conjugations, in theory if not always in practice. In English the common auxiliary verbs am, do, have, shall, will, may, can, asserting respectively existence, action, possession, obligation, volition, liberty, power, assume the function of inflexions and are themselves inflected to denote past time. In French the same inflexional law exists, the connection between the auxiliary and the root being closer than in English. *Aimer-ai*, I have to love, that is, I shall love, is compounded of the infinitive *aimer*, to love, and *ai*, I have, the first person present indicative of *avoir*. The same is the case in Italian and Spanish.

Pronominal and predicative roots are combined to form one word in the Semitic and Aryan tongues, which are therefore called inflexional, a process impossible in monosyllabic languages like the Chinese or in languages of the agglutinate order like those of the Turanian family. The Semitic and Aryan families of languages, which admit of phonetic corruption both in root and the terminations, are called organic or amalgamating languages. The pronominal termination varies according to the person or number. Thus the Sanskri *mi, si, ti*, the endings of the three persons singular of the present of the verb, are perhaps from the personal pronouns *ma, sva, ta* and the persons of the plural indicate the plural number by the form of the pronominal affixes. The plural of masculine and feminine Greek and Latin nouns of the third declension is probably a contraction of the duplication of *sa*, the pronoun of the third person. The verbs *i*, to go, *as* and *fu*, to be, supply the inflexions of certain tenses of the verb, there being also a pronominal termination varying according to the person. See GRAMMAR.

INFLORESCENCE, INFRUCTESCENCE, botanical terms referring respectively to methods of flowering and fruit-bearing. The flowering shoot, says Strasburger, frequently bears only a solitary, either axillary or terminal flower. In many cases, however, the metamorphosis of the generative region, which results in the production of flowers, has led to the formation of a special system of fertile shoots termed an inflorescence or, after the fruit is formed, an infructescence. (See FLOWER; FRUIT). Such inflorescences are wanting or ill developed among the Gymnosperms, while in the Angiosperms they are often well differentiated, constituting unities of a higher order. The modifications exhibited by the fertile shoots of such an inflorescence are due, partly to a difference in their mode of branching, partly to the reduction or the metamorphosis of their leaves. These changes are the result of an adaption to pollination, in the endeavor to aggregate and at the same time render the flowers more conspicuous by the reduction of the foliage-leaves. Sometimes the whole system of fertile shoots is converted into an attractive apparatus, as in the *Araceæ*, where the axis and the subtending leaf of the inflorescence have assumed the function, usually exercised by the perianth, of enticing insects. Viewed from a purely morphological standpoint, two types of inflorescences may be distinguished, the Botryose (racemose, monopodial) and the Cymose (sympodial).

INFLUENZA. The word is derived from the Italian *influenza di freddo,* influence, effect of cold. The other common name is grippe or grip, from the French *agripper,* to attack, or from *gripper,* to grip. The French name dates from 1712. Influenza is a febrile affection involving the respiratory tract oftenest, but attacking almost any set of tissues, especially the mucous membranes. It usually occurs as a pandemic, that is, an infection spreading to every people. It has been seen as a pandemic often since the early 16th century and there are accounts of it before. The epidemic of 412 B.C., mentioned by Hippocrates and Livy, is considered to have been influenza. The first American epidemic was in 1647, when some 6,000 deaths occurred in the Barbadoes and Saint Kitts. Cromwell is said to have died from it some 10 years later. There were four pandemic influenza periods in the last century —1830–33; 1836–37; 1847–48; and the one recalled the best, that of 1889–90. This began in Turkestan in June 1889. By the end of the year it was as far west as the Pacific. It crossed the Pacific to rage in India the following spring and in a year and a half it had circled the globe. The disease probably always originates in the East at a time when crowded populations are suffering from want and therefore lack resistive vitality against the specific microbe which gains in virulence as the result of having such favorable material to multiply in. The affection usually attracts the attention of the medical world in some European country intimately in touch with the East. It rages with virulence and receives as an epithet the name of that country for a time. The epidemic at the end of the 19th century, first noted in Russia, was for some time called Russian influenza. The epidemic of 1918–19 was, for a similar reason, called Spanish influenza.

The duration of the disease in any locality is usually under two months. There is probably no disease which attacks so large a proportion of the inhabitants of infected territory. Often one-fourth, sometimes even more than one-third, of the population catch the disease. Unlike most other diseases, adults from 20 to 40 suffer most. Infants are almost immune; the old, particularly if they have gone through a previous epidemic, seem to be protected to a great extent. Some protection is undoubtedly afforded by a previous attack, though a few persons seem to be thus predisposed to subsequent attacks. The mortality of uncomplicated influenza is low. In the German army in 1889–90, out of some 60,000 cases the mortality was not more than one-tenth of 1 per cent. The deaths from pneumonia and other complications make the disease serious. Most of the deaths during an epidemic are due to pneumonia. The disease is much more fatal at the beginning of the epidemic in any locality and deaths may take place even in strong, young, healthy adults, within two or three days after the first symptoms are manifest. The index that the epidemic is about to wane is that the disease becomes much less severe in its symptoms and less fatal. It is usually not until after this that the number of patients attacked begins to reduce and then the mortality drops rapidly. The latest epidemic followed all these rules rather closely.

The cause of the disease is not known for certain. The so-called influenza bacillus, found by Pfeiffer (1892), is practically always present in the disease and is considered by a great many good authorities to be the cause, but the etiology is not definitely settled. Other microorganisms supposed to be concerned in the causation of special epidemics have been described, notably a filterable virus, that is, a microbic agent so small that it passes through the pores of a laboratory filter, but this has not been confirmed with any degree of certainty up to the present time. The presence of this agent was noted in many cases during the recent epidemic. The disease does not spread through the air but is a true contagion requiring for transmission contact, direct or indirect, with an individual suffering from the disease. The bacillus of Pfeiffer has been found in a very great many cases in large numbers in the secretions of the nose, throat and lungs, though the supposition that it must produce catarrhal symptoms, running from the eyes and nose, has not been confirmed in the present epidemic. It is found to exist luxuriantly in the back of the throat, growing in and between the cells and being distributed from here through the body to produce the respiratory or gastro-intestinal symptoms. The infection may readily occur therefore from the hands in eating, and one of the most important precautions against the disease is thorough cleansing of the hands before meals. The bacillus may be scattered around for considerable distances by coughing or sneezing, so that it is important to insist on the use of a handkerchief, or still better, of some waste cotton material or soft paper that can be burned, to be placed before the nose and mouth during sneezing and coughing.

The best protective against the disease is a state of vigorous health. The respiratory organs particularly should be kept in the best possible health and that is secured by plenty of outdoor air, especially in the sunlight. People who are run down in health should avoid coming in contact with patients affected by the disease, though apparently the presence of tuberculosis in the lungs, in spite of its consumptive effect, helps to protect against rather than predispose to the disease, for tuberculosis patients do not suffer much from influenza. The mouth and nose should be kept clean, but rough cleansing or the use of strong antiseptics will probably do more harm than good. The cells of the mucous membrane of the mouth and nose may be rendered less capable of resisting invasion. The use of chemical protectives and the carrying of camphor and other odoriferous materials with the thought that they protect against the disease is without confirmation in experience. The treatment of the disease is that of fevers in general but with an abundance of fresh air. During the epidemic of the '90's the coal-tar products, antipyrin, acetanilid and other similar materials were used in large quantities because they reduced the fever and made the patient more comfortable by their anodyne effects. They have a tendency to favor the destruction of red blood corpuscles and as the disease has a similar tendency, the combined result was often serious for the patient. They probably did much more harm than good. The pains in the bones at the beginning of influenza represent the effect of the disease on the blood forming marrow of the flat bones and the con-

sequent blood deterioration predisposes to heart and other complications, hence the necessity for rest, once the fever declares itself, which should be continued until the extreme feeling of prostration often associated with the disease is relieved. The individual must be helped by general supporting treatment until the tissues are able to throw off the disease. Without complications the fever usually comes down on the fourth or fifth day, but the patient often has to stay in bed for nearly a week longer. When pneumonia occurs it is lobular, attacking the lobules and not the lobes of the lungs and ends by lysis, that is, by gradual absorption of the effusion, and not by crisis as in ordinary pneumonia. Supporting treatment is extremely important. The bowels must be kept regular so as not to interfere with movements of the diaphragm, and above all, the patient's mind must be set at rest as far as possible. Discouragement is a serious element for the prognosis and patients must not be told of the death of relatives or friends. Alcohol has been used with reported benefit, but the only good effect it may have is by lessening the dread of the affection which in some people's minds amounts to a serious pathological factor.

After previous epidemics of influenza, the disease has always become endemic, that is, sporadic cases of it have occurred years afterward, sometimes almost in epidemic form. This will almost surely happen at this time also, so that respiratory affections, especially in the changeable seasons of the year, will take on a special influenzal character. The particular strain of the bacillus whose evolution has been fostered by war conditions will gradually lose virulence, but continue with us for some time.

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INFORMATION, a proceeding for some offense, usually against the government, differing from an indictment in not being found by a grand jury. It is usually brought by an authorized public official and is in use in the United States and England. The use of the information in the United States is restricted to misdemeanors in criminal cases, and it is allowed in certain civil cases, as to bring a person into court who has assumed the duties of a civil office to show by what authority he so acts, or to arraign a corporation for failing to observe the provision of its charter, etc. In England to-day information in criminal cases is brought by the Attorney-General or Solicitor-General, but not for treason, misprision of treason or felonies. However, it is rarely used there except for aggravated offenses, such as sedition, or crimes that are pernicious, as attempting to bribe public officials. In addition, informations are filed in the Court of Exchequer in revenue cases. In the United States also, in some jurisdictions, violations or attempted violations of the revenue laws are proceeded upon by information. The term is also applied to the written sworn statement made, as before a committing magistrate, prior to the issuance of a summons or complaint against a person charged with certain offenses.

INFORMER, a person who sues for a penalty against those who have infringed any law or penal statute. To encourage the apprehending of certain felons, guilty of offenses not so much criminal as bordering on criminality, many English statutes, from 1692 downward, granted rewards to such as should prosecute to conviction. The penalty in whole or in part inflicted in the case of a successful conviction and immunity from certain troublesome parish offices were the inducements held out to informers. In many cases this practice has been resorted to in modern statutes. But the institution of a Crown prosecutor in England and of prosecuting attorneys in the United States has nullified the importance of informers to a great extent. In the United States one who informs the government of the whereabouts of smuggled goods, counterfeit money, etc., is rewarded by a fee of 10 per cent of the net value of the confiscated goods. In criminal law (q.v.) an informer is said to turn state's evidence.

INFRALAPSARIANISM, in soteriology, the characteristic theological tenet and practice of those Calvinists and even also of some Roman Catholics, who maintain the dogma of absolute divine decrees of election and approbation and consider the decree of election as contemplating the apostasy as a past event, and the elect as being at the time of election in a fallen and guilty state. Infralapsarianism is really synonymous with sublapsarianism, and is opposed to supralapsarianism. Sublapsarianism conveys the general idea of having been "done after the time of the fall of man"; and this too is the meaning, considered etymologically, of infralapsarianism also. The Infralapsarians suppose that God in predestinating had respect to man, not merely as a fallen being, but specifically as either also redeemed through union with Christ, or as condemned through final impenitence. This, it need scarcely be said, amounts to an assertion that God decrees men to suffer His wrath on the ground of their foreseen guilt. This is the ultra-Calvinism of the Gomarist school. And it is consciously or unconsciously, implicitly or explicitly, presupposed — that an all-loving God somewhere in His Word appears as Creator of men simply with the sovereign purpose of then damning them eternally! It assumes likewise that believers are elected on the ground of foreseen faith and obedience, whereas the finally impenitent are predestinated to perdition by a damnatory decree on the grounds of their foreseen impenitency. This rigid Christianity refers the eternal election of men and their reprobation by God to his foreseeing, rather than his positively decreeing, that all men would fall in Adam, and thus would deserve reprobation; and thus the election of grace becomes conceived as simply a remedy for existing evil. Out of the entire mass of mankind thus fallen, God in his sovereign grace freely elects a certain number to life; and by virtue of the same electing act, He in an equal exercise of his sovereignty leaves others, non-elect, to the death which their sins deserve. Some, calling themselves Preteritionists, hold a modified — can it be said a less gloomy? — view on this subject. These reject the dogma that God has determined in the exercise of his authority to elect any, but to blessing. Yet they nevertheless contend for the decree of preterition, in virtue of which God has determined to pass by those who are not saved. Can it be necessary more than to allude to the gross fatalism inherent in

all these dogmas? Here the Bible takes on the aspect of a gloomy epic, terrible and grand as the elder 'Edda,' a book to plunge man into melancholy; the prophets thunder out doleful menaces; men burden their minds with the pitiless doctrines of Calvin. Fancy, if you can, the effects of such ideas on solitary and morose minds! An anthropomorphic superstition pervades them all. Admitting for a moment that God decrees anything at all (which, seriously, is to look upon him as Zeus, or even as a human legislator, making enactments)—might one not logically adopt the principle that He decrees in respect of what He does, but not in respect of what He does not do; and conclude that He decreed, by an absolute decree, to save the saved, but did not decree not to save the lost? And, obiter dicta, in all fatalism, whether (said to be) Christian, Mohammedan, Hellenic, Old Norse, Roman or Teutonic, whether Materialistic, Socialistic, Individualistic or Intellectualistic—and all are *variations* on a single theme—there is involved a fictitious idea both of causation and of necessity. Man's will is free. And it is no more logical—and this all determinists do, whether openly or tacitly—to presuppose that prevision creates the future, than to presuppose that memory creates the past.

INFRINGEMENT, a breach or violation of an agreement or right, especially the infraction of the copyright, patent rights or trademark of another. The usual method of procedure for the injured party is to secure an injunction restraining the infringement and to enter an action for the damages sustained. See COPYRIGHT; PATENTS, etc.

INFUNDIBULUM. See PITUITARY BODY.

INFUSION, in pharmacy, an aqueous solution of a medicinal substance obtained by treating with water, usually without the aid of boiling. The water may be either hot or cold, varying with the object to be obtained. According to the directions of the United States Pharmacopœia, infusions are generally prepared by pouring boiling water upon the drug and macerating in a tightly closed vessel until the liquid cools. The active principles are in this manner extracted more rapidly and, as a rule, in much larger portions than if the solution is colder. Heat is not advisable if the active principles are volatile. If an infusion is desired of a greater degree of concentration than that obtained by the process of maceration, it is frequently prepared by percolation, in which operation the drug is sliced or broken up into small fragments, packed in a percolator, and the water, either hot or cold, is passed through. Infusions are sometimes made with the aid of other liquids than water, but this is the exception rather than the rule. Infusions do not keep well, and therefore they should be made extemporaneously and in small quantities. In household medicine, infusions are very widely employed. These may be made at home or made by the pharmacist. It is essential to remember that if they are made in hot weather in large quantities they must be sterilized.

Infusion of saline solution into the blood-vessels is a very important procedure in medicine. It is employed largely in the treatment of shock and in severe hemorrhage, especially following operations or childbirth. The solution that is used is known as a normal salt-solution and consists of about one teaspoonful of common salt to a pint of water. This solution should be boiled carefully for one-half to three-quarters of an hour, the amount of evaporating water being made up as the boiling proceeds, and after being made it should be kept in large bottles provided with cotton plugs for stoppers. In severe cases of hemorrhage, infusion has often saved life, as it provides a body of fluid on which the heart and blood-vessels can act. The salt-solution is usually introduced into one of the large veins of the arm at a temperature of one to two degrees above that of the body temperature. See BLOOD; TRANSFUSION.

INFUSORIA, protozoa or organisms of the primary division of the animal kingdom, consisting of single cell or groups of cells, of the classes *Flagellata* and *Ciliata,* so-called from propagating and abounding in infusions of organic matter. While the term, first used in 1763, is now restricted to the ciliate protozoans, it often includes the flagellate protozoans as well. The latter are represented by the monads. These are exceedingly minute, round or pear-shaped animals, which move by one or two lash-like processes called flagella. They contain a nucleus and contractile vesicles. Some of them are fixed by a stalk, and are provided with a collar, as in *Codosiga,* out of which the flagellum projects. One of the simplest monads (*Heteromita*) is obtained by placing a cod's head in water at a temperature of about 70° F. In a few days the water will swarm with these monads. The young germs will live in boiling water, but perish at a temperature of from 212° to 268° F., while the adults are destroyed at 142° F.

In the ciliata infusoria the body is more or less flattened and covered with cilia (*Paramecium,* etc.). They have on the under side of the body a slightly defined mouth (or cytostome), which is permanently open, and the food is swept into it by the action of the cilia around it. The mouth leads into a funnel-shaped throat or cytopharynx, which ends in the protoplasm of the body. The food-particles swept into this throat and pressed into the protoplasm form a small enlargement which finally sinks farther in forming the "food vacuole," which, by the flow of the protoplasm, is carried about the body, while the digestible portions are absorbed and the waste matter is cast out at a fixed point,—a sort of vent (cytopyge). The fresh-water forms have contractile vesicles, and in certain species the animal possesses so-called stinging rods (trichocysts), which are very minute and are placed vertically to the surface of the cortex; by some students they are supposed to be tactile rather than stinging structures. What correspond to the muscular fibres of the higher animals cause the quick convulsive movements observed in these creatures. Two important organs are present in all ciliate infusoria, that is the nuclei. The larger nucleus (macronucleus) is an oval, rod-like or spiral body, which appears to control the processes of feeding and motion. The other nucleus (micronucleus) is much smaller and is concerned with reproduction. Reproduction occurs usually by self-division, and more rarely the infusorians contract into a ball and divide

into spores, which grow to become adults. The periods of fission are at times interrupted by the process of conjugation, which only differs from sexual reproduction in the fact that two individual infusorians meet and fuse together and then separate, the result being a process of fertilization which leads to a complete new formation of the nucleus, and thus to a new organization of the animal.

The more specialized infusoria are *Stentor* and *Vorticella*. The former is large enough to be seen without a lens. It is purplish, and under the microscope shows itself to be a beautiful creature. It is trumpet-shaped, with a spiral tract of thicker cilia around the mouth-end. The most highly organized infusoria are the bell-animalcules (*carchesium*, etc.), which are compound bell-shaped forms, forming colonies with forked branched stalks. The nucleus is sausage-shaped, and near it is the micronucleus. They form a white mass like mold on the stems and leaves of aquatic plants. Some of the infusoria are parasitic in the digestive and circulatory organs of the higher animals. For a more detailed and illustrated account, consult, W. Saville-Kent's 'Manual of the infusoria, including a description of all known flagellate, ciliate and tentaculiferous protozoa, British and foreign, and an account of the organization and affinities of the sponges' (London 1880–82).

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INFUSORIAL EARTH, a term often but incorrectly applied to diatomaceous earth. See DIATOMS.

INGALLS, in'gâlz, **James Monroe,** American soldier: b. Sutton, Vt., 25 Jan. 1837. He served in the Civil War, participating in the Atlanta campaign, and remained in the South during the Reconstruction period until 1871. In the following year he was graduated at the Artillery School, Fort Monroe, Va. In 1882 he founded the department of ballistics at the United States Artillery School, Fort Monroe, and was principal instructor there until the school suspended operations in April 1898, on the outbreak of war with Spain. He was retired from the army 25 Jan. 1901 and was advanced to the rank of colonel, retired, by act of 23 April 1904. He has written on professional topics for encyclopedias and in the *Journal of United States Artillery* and the volumes 'Exterior Ballistics' (1883; 1885; 1886); 'Ballistic Machines' (1885); 'Handbook of Problems in Exterior Ballistics' (1890; 1901); 'Interior Ballistics' (1894; 1911); 'Ballistic Tables' (1891; 1900); 'Ballistics for the Instruction of Artillery Gunners' (1893).

INGALLS, John James, American lawyer: b. Middleton, Mass., 29 Dec. 1833; d. Las Vegas, N. Mex., 16 Aug. 1900. He was graduated from Williams College in 1855, and was admited to the bar in 1857. In 1858 he moved to Kansas and established a law practice there, first in Sumner, and in 1860 in Atchison. In 1859 he was a delegate to the First Constitutional Convention. He was secretary of the territorial council in 1860, and of the State senate in 1861, and in 1862 was elected a member of the senate. During the Civil War he acted as judge-advocate of the Kansas militia (1863–65) and for three years edited the Atchison *Champion*. In 1873 he became a Republican member of the United States Senate, and was re-elected in 1879 and 1885. Charges that bribery had been practised in connection with his election in 1879 were made in and investigated by both the Kansas house of representatives and the United States Senate. They were found to be partially true, but Senator Ingalls himself was entirely exonerated and the claim to his seat was fully sustained. He was president pro tem. of the Senate from 1887–91. In 1891 he was again a candidate for senator, but was defeated by the Farmers' Alliance. During his service in the Senate he was known as one of its most eloquent members. From that time till his death he devoted himself chiefly to lecturing and writing. His writings were published by Conelley, W. E., ed., 'A Collection of the Writings of J. J. Ingalls' (Kansas City 1902). Consult Inman, H., 'J. J. Ingalls' (in 'Distinguished American Lawyers,' H. W. Scott, ed., p. 457, New York 1891); Kansas Bribery Investigation Committee, 'Report of the Special Committee of the Kansas House of Representatives, etc.' (Topeka 1879); Taft, G. S., 'Compilation of Senate Election Cases' (49th Congress, 1st Session, Senate Misc. Doc., No. 47, Washington 1885).

INGALLS, Melville Ezra, American railroad president: b. Harrison, Me., 6 Sept. 1842; d. 11 July 1914. He was educated at Bowdoin and at Harvard. He practised law successively at Gray, Me., and at Boston, Mass. In 1867 he was elected to the senate of Massachusetts. Becoming interested in railroads he was, in 1870, president of the Indianapolis, Cincinnati and Lafayette Railroad and in the following year was appointed its receiver. After effecting a thorough reorganization he added other roads which together are known as the "Big Four," the Cleveland, Cincinnati, Chicago and Saint Louis Railroad. He was chairman of the system until 1912 when he retired. He was also for many years executive head of the Chicago and Ohio Railway Company and in 1905 was chosen president of the National Civic Federation.

INGALLS, Rufus, American soldier: b. Denmark, Me., 23 Aug. 1820; d. New York city, 15 Jan. 1893. He was graduated from West Point in 1843, fought in the Mexican War and was brevetted first lieutenant for gallant and meritorious conduct. In 1854–55 he was a member of Steptoe's expedition to the Northwest. At the outbreak of the Civil War he defended Fort Pickens, Fla., then became quartermaster of the Army of the Potomac, and was present at many of the important engagements, was twice brevetted for gallant and

meritorious conduct, and at the close of the war had attained the rank of major-general. In 1867 he became successively quartermaster of the military division of the Atlantic, Pacific and the Missouri, quartermaster-general of the United States army, and brigadier-general in 1882 and was retired in 1883.

INGE, ĭnj, **William Ralph**, English clergyman and author: b. Crayke, Yorkshire, England, 6 June 1860. He was educated at Eton and at Kings College, Cambridge, where he won many honors. He was assistant master at Eton, 1884–88. At the same time, 1886–88, he was Fellow of Kings College. In 1889–1904 he became Fellow and tutor of Hertford College, Oxford. He was vicar of All Saints, Ennismere Gardens, London, 1905–07, Margaret professor of divinity, Cambridge 1907–11, and since 1911 dean of Saint Paul's, London. He was select preacher at Oxford 1893–95, 1903–05; at Cambridge in 1901, 1906 and 1910. In 1899 he delivered the Bampton Lectures, and in 1906 he delivered the Paddock Lectures in New York City. In 1915 he was lecturer at Sion College. In 1902 he was examining chaplain for the bishop of Lichfield. He is the author of several school books and is an authority on the subject of mysticism. His works include 'Society in Rome Under the Cæsars' (1886); 'Christian Mysticism' (1899); 'Faith and Knowledge' (1904); 'Selections from the German Mystics' (1904); 'Studies of English Mystics' (1906); 'Truth and Falsehood in Religion' (1906); 'Personal Idealism and Mysticism' (1907); 'Faith' (1909); 'Speculum Animæ' (1911); 'The Church and the Age' (1912); 'Authority and the Inner Light' (1913); 'Types of Christian Saintliness' (1915).

INGELOW, ĭn'jĕ-lō, **Jean**, English poet and novelist: b. Boston, Lincolnshire, 17 March 1820; d. Kensington, London, 20 July 1897. Her first published work appeared anonymously in 1850 under the title 'Rhyming Chronicle of Incidents and Feelings.' It was followed by 'Allerton and Dreux: or the War of Opinion' (2 vols., 1851), a story, and 'Tales of Orris' (1860); but not till the publication of 'Poems,' in 1863, did Miss Ingelow become famous. This volume won the enthusiastic praise of critics and the instant approval of the public, and by 1879 had passed through 23 editions. The most widely appreciated poems in it are 'The High Tide on the Coast of Lincolnshire'; 'Songs of Seven'; 'Divided'; and 'Supper at the Mill.' Later volumes were 'Studies for Stories' (1864); 'Stories told to a Child' (1865); 'Poor Mat' (1866); 'A Sister's Bye-Hours' (1868); 'Mopsa the Fairy' (1869); 'Off the Skelligs' (4 vols., 1872), her first long story; 'The Little Wonder Horn' (1872), a new series of stories told to a child; 'Fated to be Free' (3 vols., 1881); 'Sarah de Berenger' (3 vols., 1879); 'Don John' (3 vols., 1881); and 'John Jerome' (1886). A second volume of verse, 'A Story of Doom and Other Poems,' appeared in 1867 and a third volume, 'Monitions of the Unseen' in 1885. Collections of her poems were published as 'The Poetical Works of Jean Ingelow' (New York 1894; London 1898). Her works have been even more popular in America than in her native country. She was at her best as a writer of children's stories, even though her popularity during her life was based chiefly on her poetry. The latter contains some few very excellent pieces, but the bulk of it has not stood the test of time. In her own days, however, she was greatly admired for her songs, and many of her poems, indeed, have considerable lyrical merit. Consult Anon., 'Some Recollections of Jean Ingelow and her Early Friends' (London 1901); Stuart, G. B., 'Personal Recollections of Jean Ingelow' (in *Lippincott's Monthly Magazine*, Vol. LXXVII, p. 306, Philadelphia 1906).

INGEMANN, ĭng'ĕ-măn, **Bernhard Severin**, Danish poet and novelist: b. Torkildstrup, on the island of Falster, 28 May 1789; d. Sorŏ, 24 Feb. 1862. He was educated at the University of Copenhagen, and it was while a student there that he published his first 'Poems' (1811–12), of a dreamy, melancholy nature, showing the influence of German romanticism, and displaying the unhealthy state of his body and mind. In 1814 he published a long allegorical poem, 'The Black Knights,' which showed a marked advance. The next six works which he produced were plays, the tragedy 'Blanca,' brought out in 1815, being the most popular and successful, though 'The Miraculous Child Reinald' (1816) was undoubtedly the best. 'The Subterranean Ones, a Story of Bornholm,' his first prose work, was written in 1817, and the following year he started on a tour of the Continent, returning in 1819. On his return he wrote his 'Stories and Miraculous Tales,' which was published in 1819, followed in 1820 by two volumes of poems, 'The Travel Lyre,' and in 1821 by a comedy, 'Magnetism in a Barber's Shop,' which, however, was unsuccessful, and thereafter he confined himself to prose work. In 1822 he accepted the chair of Danish language and literature at the Academy of Sorŏ, and then began his voluminous writings on historical subjects, his novels probably being inspired and copied from the Waverly novels, by Scott. The subjects and characters were taken from Danish history, and, while they were to a great extent inaccurate, were possessed of such strong nationality that they became of great interest. Among these historical romances were 'Valdemar the Victorious' (1826); 'Erik Menved's Childhood' (1828); 'King Erik and the Outlaws' (1833); 'Prince Otto of Denmark and His Time' (1835); 'Queen Margaret' (1836); 'Holger Danske' (1837). From 1837–39 he wrote a collection of 'Evening and Morning Songs,' which became very popular on account of their great beauty of religious expression. From this time until his death his writings were mainly religious and the last of his works, 'The Apple of Gold,' was published in 1856. A number of his works have been translated into English and many of them into German. His collected works in 41 volumes were published in Copenhagen (1843–65). He left an autobiography which was edited by Galskjöt (1862). His correspondence was published in 1879, edited by V. Heise, and his letters to Grundtvig were edited by S. Grundtvig (1882). Consult Brandes, G., 'Essays' (Copenhagen 1889); Nörregaard, J., 'B. S. Ingemanns Digterstilling og Digterværd' (Copenhagen 1886); Petersen, R., 'Mindeskrift over B. S. Ingemann' (Copenhagen 1889): Schwanen-

flügel, H., 'Ingemanns Liv og Digtning' (Copenhagen 1886).

INGENHOUSZ, ĭng'ĕn-hous', **Jan,** Dutch physician and scientist: b. Breda, Holland, 8 Dec. 1730; d. Bowood, the seat of the Marquis of Lansdowne, England, 7 Sept. 1799. He studied medicine at Louvain, Leyden, Paris and Edinburgh, and after practising in his own country for several years removed to London in 1764 or 1765. In 1769 he was appointed aulic councillor and body physician to the Austrian Empress, Marie Theresa, and to Joseph II, introducing vaccination against smallpox in Vienna. After serving for nine years in that capacity he returned to London, where he began his scientific researches, later becoming a fellow of the Royal Society, and publishing in its 'Philosophical Transactions' several treatises and essays. From 1780–89 he again resided in Vienna, devoting himself chiefly to experiments in chemistry, physics and botany. From 1789–99 he lived in England. His works include 'Experiments on Vegetables, Discovering Their Great Power of Purifying the Common Air in Sunshine, but Injuring it in the Shade, or at Night' (London 1779; Leipzig 1780; Paris 1787–89); 'Respiration of Plants' (Vienna 1786); 'Miscellanea Physico-Medica' (Scherer, J. A., ed., Vienna 1795); 'Essay in the Food of Plants and the Renovation of Soils' (London 1796). Collections of his scientific papers were published in German (Vienna 1785) and in French (2 vols., Paris 1785–89). Dr. Ingenhousz is credited with being the discoverer of carbonic acid, assimilation of plants, and he also invented the plate electrical machine. Consult Weisner, J., 'Jan Ingen-Housz' (Vienna 1905).

INGERSOLL, ing'gĕr-sŏl, **Charles Jared,** American statesman, lawyer and author; son of Jared Ingersoll (q.v.): b. Philadelphia, 3 Oct. 1782; d. there, 14 May 1862. After finishing his collegiate course he studied law, was admitted to practice, traveled in Europe and became attached to the American embassy to France. In 1812 he was elected to Congress, taking his seat in May 1813. In 1815 he was appointed United States district attorney for Pennsylvania, an office which he held until 1829. Shortly after he was elected to the legislature of Pennsylvania. He was a member of Congress 1841–47 as representative of one of the districts of which the county of Philadelphia was then composed. He was the author of the poem 'Chiomara' (1800), of the tragedy 'Edwy and Elgwia' produced in Philadelphia (1808), of 'Julian' (1831); and of 'Inchiquin — the Jesuit's Letters on American Literature and Politics' (1810); 'Historical Sketch of the Second War between the United States and Great Britain' (4 vols., 1845–52), etc. Consult Meigs, W. W., 'Charles Jared Ingersoll' (Philadelphia 1898).

INGERSOLL, Ernest, American naturalist: b. Monroe, Mich., 13 March 1852. He studied at Oberlin College and in the Lawrence Scientific School and Museum of Comparative Zoology of Harvard University, where he was a pupil of Agassiz, and in 1874 and 1877 was connected as naturalist with the Hayden survey. He was also an expert on the United States Fish Commission, and later became known as a popular writer and lecturer on scientific subjects. In 1901 he was lecturer in zoology at the University of Chicago. Among his works are 'Nests and Eggs of North American Birds' (1880–81); 'Oyster Industries of the United States' (1881); 'Knocking 'Round the Rockies' (1883); 'Country Cousins' (1884); 'The Crest of the Continent' (1884); 'Down East Latch-Strings' (1887); 'Wild Neighbors' (1897); 'The Book of the Ocean' (1898); 'Nature's Calendar' (1900); 'Wild Life of Orchard and Field' (1902); 'The Life . . . of Mammals' (1906); and several popular juvenile tales, notably 'The Ice Queen.' He is editor of the 'Farmer's Practical Library,' secretary of the Authors Club (New York), and an officer of the National Association of Audubon Societies.

INGERSOLL, Jared, American politician: b. Milford, Conn., 1722; d. 1781. Upon the passage of the Stamp Act he was appointed, in 1765, a stamp agent in Connecticut and accepted the post by the advice of Franklin. This subjected him to the personal abuse and insults from which all colonial stamp agents suffered, and finally he was forced to resign; later, in 1770, becoming an admiralty judge. He was the author of a pamphlet called 'The Stamp Act' (1776).

INGERSOLL, Jared, American lawyer: b. Connecticut 1750; d. Philadelphia, 21 Oct. 1822. Having been graduated at Yale College in 1766, he went to London, was entered of the Middle Temple and passed five years in the study of law. The American Revolution breaking out while he was still in London, he espoused the cause of the colonies, although the son of a Loyalist. He went from London to Paris, where he remained for 18 months, making the acquaintance of Franklin. Returning home, he took up his residence in Philadelphia, where he won almost immediately a prominent position as a lawyer. In 1787 he was chosen one of the representatives of Pennsylvania in the convention which framed the United States Constitution. Twice attorney-general of the State, he was United States district attorney for Pennsylvania, presiding judge of Philadelphia County District Court and in 1812 the Federal candidate for Vice-President of the United States.

INGERSOLL, Leonard Rose, American educator: b. New York, 1 June 1880. He was graduated at Colorado College in 1902 and received the degree of D.Ph. at the University of Wisconsin in 1905. In 1905–08 he was instructor, in 1908–10 assistant professor, and since 1910 associate professor of physics at the University of Wisconsin. He is a Fellow of the American Association for the Advancement of Science and member of the American Physical Society. He was a member of the Smithsonian expedition to Mount Wilson, Cal., for solar investigations in 1905, 1906 and 1909. With O. J. Zobel he published 'An Introduction to the Mathematical Theory of Heat Conduction' (1913). He has contributed many articles to scientific journals, chiefly on subjects connected with the electro-magnetic theory of light.

INGERSOLL, Robert Green, American lawyer, lecturer and author: b. Dresden, N. Y., 11 Aug. 1833; d. Dobb's Ferry, N. Y., 21 July 1899. He received a common school education

in various towns in Ohio and Illinois where his father, a minister, held charges and was admitted to the bar at Mount Vernon, Ill., in 1854. He soon became prominent in the courts and in Democratic politics. In the Civil War he recruited the 11th Illinois Cavalry and entered the army as its colonel. He was in the battle of Shiloh and saw considerable fighting in Tennessee. On 18 Dec. 1862, while trying with a force of 600 men to intercept a Confederate raiding party, he was captured by a force of 10,000 men but was soon paroled and given command of a camp in Saint Louis. He soon afterward resigned. After the war he became a Republican, and was made attorney-general of Illinois in 1867. He was a delegate to the Republican National Convention in 1876 and placed in nomination for President James G. Blaine, whom he termed "the plumed knight." His nominating speech gave him national reputation as an orator, and he afterwards lectured frequently, always before immense crowds. He was an agnostic and in his lectures attacked the Bible and the beliefs of the Christian religion. He was prominent in politics for several years, and had he not given such frequent expression to his agnostic views he would doubtless have been honored with high offices, though, to judge from his refusal of two or three diplomatic posts, he was far from eager for office. He took up his permanent residence in New York city in 1882 and practised law there till his death, being one of the most successful trial lawyers of his times. His lectures on theological subjects formed for many years the basis of extensive and frequently violent discussion and attacks. His most famous lectures include 'Some Mistakes of Moses'; 'The Family'; 'The Liberty of Man, Woman and Child'; 'The Gods'; and 'Ghosts.' His publications include 'Lectures Complete' (1886); 'Prose, Poems and Selections' (1888); 'Famous Speeches' (1906); and 'Political Speeches' (1914). A complete collection of his works was published in 12 volumes (New York 1912). Consult Brann, H. A., 'The Age of Unreason' (New York 1881); Curtiss, S. I., 'Ingersoll and Moses' (Chicago 1880); Dement, R. S., 'Ingersoll, Beecher and Dogma' (Chicago 1878); Duganne, A. J. H., 'Injuresoul; a Satire for Science' (New York 1884); Goldthwaite, V., 'The Philosophy of Ingersoll' (San Francisco 1906); Hubbard, E., 'Ingersoll' (in 'Little Journeys to the Homes of Eminent Orators,' (Vol. XIII, p. 23, East Aurora 1903); Kittredge, H. E., 'Ingersoll; a Biographical Appreciation' (New York 1911); Lambert, L. A., 'Notes on Ingersoll' (Buffalo 1883); McClure, J. B., ed., 'Mistakes of Ingersoll, etc.' (Chicago 1879); United States War Department, 'The War of the Rebellion. (Official Records' (Series I, Vol. XVII, Washington 1886–87).

INGERSOLL, Royal Rodney, American naval officer: b. Niles, Mich., 4 Dec. 1847. In 1868 he was graduated at the United States Naval Academy. He was promoted through the various grades, attaining that of rear-admiral in 1908, and retired the following year. He has served as naval officer in all parts of the world. During the war with Spain he commanded the *Supply* and in 1905 was in command of the *Maryland*. He was member of the General Board of the Navy at the time of his retirement. On 7 July 1917 he was again placed on duty in the Bureau of Ordnance. He has published 'Text-Book of Ordnance and Gunnery' (1887); 'Exterior Ballistics' (1891); 'Elastic Strength of Guns' (1891).

INGERSOLL, Canada, town in Oxford County, Ontario, on the Thames River and the Grand Trunk Railway, 19 miles northeast of London. It is the marketing centre for a rich grain and fruit-producing section, and has an important trade in lumber, grain, cheese and general country produce. It has manufactures of iron products, machinery, agricultural implements, woolen goods, woodenware, lumber and creamery products; banks, and weekly newspapers. Pop. 4,763.

INGHAM, ĭng'ăm, **Benjamin,** English evangelistic leader: b. Ossett, Yorkshire, 11 June 1712; d. Aberford, 1772. He received his education at Batley School and at Queen's College, Oxford, where he graduated B.A. in 1734. In 1735 he was ordained, and, becoming associated with John and Charles Wesley, went with them to Georgia, remaining two years. In 1738 he went with John Wesley on a visit to the Moravians in Germany and became so strongly attached to their doctrines that he broke with the Wesleys and founded in Yorkshire several congregations of what were known as "Moravian Methodists," but more commonly as "Inghamites." He endeavored to unite in this organization the chief doctrines of the Moravians and Methodists, and so successful was he as bishop or general overseer that in a few years there were 84 of these congregations in England. He moved to Aberford about the time of his marriage with a daughter of the Earl of Huntingdon in 1741 and succeeded in converting the whole surrounding neighborhood to his faith. In 1760, however, the greater part of his followers deserted him after he adopted many of the mystical views of Robert Sandeman (q.v.). Only about 13 of the Inghamite churches followed him into the Sandemanian sect. The rest were absorbed by other sects, especially by the Methodists. He wrote 'A Discourse on the Faith and Hope of the Gospel' (Leeds 1763). Consult Tyerman, L., 'The Oxford Methodists' (London 1873).

INGHAM, Charles Cromwell, American painter: b. Dublin, Ireland, 1796; d. New York, 10 Dec. 1863. He was a pupil of William Cunning at the Dublin Academy, came to New York in 1817, was there a founder of the National Academy of Design (1826), and its vice-president in 1845–50. He painted many portraits and miniatures of beautiful women and children, as well as of prominent men; amongst the latter are to be mentioned portraits of De Witt Clinton and Lafayette. His works include 'Day Dream'; 'The White Plume'; 'The Flower Girl'; 'The Death of Cleopatra.'

INGLE, Richard, English sea captain of the 17th century. When the civil war arose in England Ingle was engaged in the tobacco trade in Maryland. He espoused the cause of the Parliament against Charles I and in 1645 expelled Governor Calvert from Maryland. The latter, however, gathered forces and again took possession of the province late in 1646. During the 20 months of his rule Ingle committed many outrages and plundered several of the inhabitants. Charges were made against him in Eng-

land which he defended on the ground that he acted from religious motives and plundered only "Papists." When the proprietary government was restored Ingle was not included in the general amnesty granted to other rebels. On 14 Nov. 1653 he petitioned for a share of prize money and thereafter disappears from history. Consult 'Captain Richard Ingle, the Maryland Private and Rebel, 1642–53' (Baltimore 1884).

INGLEBY, ĭn'g'l-bĭ, **Clement Mansfield,** English author and Shakespearean critic: b. Edgbaston, near Birmingham, 29 Oct. 1823; d. Ilford, Essex, 26 Sept. 1886. After graduating from Trinity College, Cambridge, he entered into partnership with his father, but in 1859 gave up his law practice and moved to Ilford, where he began writing for the magazines on scientific and metaphysical subjects. His best-known works are his Shakespearean studies, among which are 'The Shakespere Fabrications' (1859); 'Shakespere Controversy' (1861); 'Shakespere's Centurie of Prayse, etc.' (1874); 'The Still Lion' (1874; new edition 1875, entitled 'Shakespere's Hermeneutics'); 'Shakespere: the Man and the Book' (1877–78). He also wrote 'Outlines of Theoretical Logic' (1856); 'An Introduction to Metaphysics' (1864–69), etc.

INGLEFIELD, Sir **Edward Augustus,** English admiral and explorer: b. Cheltenham, 27 March 1820; d. 5 Sept. 1894. He was educated at the Royal Naval College, Portsmouth; went to sea at 14, and participated in the naval operations on the coast of Syria in 1840. He became commander in 1845. He commanded the yacht *Isabel* in 1852 on a cruise to Smith Sound in search of Franklin. He published a narrative of this cruise, 'A Summer Search for Sir John Franklin' (1853). As commander of the *Phœnix* he afterward made three voyages to the Arctic; in 1854 he rescued part of the Belcher expedition and later in the same year made a last futile attempt to find Sir John Franklin. He took part at the siege of Sebastopol during the War of the Crimea. In 1877 he was knighted and two years later was made admiral. He invented the anchor known by his name and a hydraulic steering-gear. He was also a competent marine artist.

INGLIS, ĭng'lz, **Charles,** American Anglican bishop: b. according to some authorities New York, according to others Ireland 1734; d. Halifax, Nova Scotia, 1816. After teaching school for a few years near Lancaster, Pa., he was ordained in England. He was at first assigned to a missionary post at Dover, Del., and in 1765 became assistant minister at Trinity Church, New York. About 1770 he became one of the governors of King's College, now Columbia University. A stout Loyalist, he refused to omit from the service the prayer for the king and royal family, and upon the occupation of New York by Washington retired for a time to Long Island. In 1770 he received an honorary M.A. degree, and in 1778 that of doctor of divinity, both from Oxford University. In 1777 he was chosen to the rectorship of Trinity, and in 1783, at the evacuation of New York by the British, went to Halifax in the emigration of the United Empire Loyalists. He was consecrated in 1787 bishop of Nova Scotia (with jurisdiction over the other North American provinces), and was the first colonial bishop of the Church of England. In 1809 he became a member of the Council of Nova Scotia. He published sermons and pamphlets. Consult Dix, M., 'A History of the Parish of Trinity Church in the City of New York' (4 vols., New York 1898–1906); Eaton, A. W. H., 'Bishop Charles Inglis and his Descendants' (in *Acadiensis*, Vol. VIII, No. 3, p. 183, Saint John 1908); O'Callaghan, E. B., ed., 'Documentary History of New York' (4 vols., Albany 1850–51); Perry, W. S., 'History of the American Episcopal Church' (2 vols., Boston 1885); Sabine, L., 'Loyalists of the American Revolution' (2 vols., Boston 1864); White, H. V., 'Charles Inglis, our First Colonial Bishop' (Dublin 1899).

INGLIS, John, Canadian bishop: b. New York 1777; d. London, England, 1850. He was a son of Bishop Charles Inglis (q.v.), graduated at King's College, Windsor, Nova Scotia, and was consecrated third bishop (Anglican) of Nova Scotia, 25 March 1825. He was a benefactor of King's College and viewed with disfavor the Anglican "test" imposed as a condition of entrance to that institution.

INGOLD, Augustin Marie Pierre, French clergyman and author: b. Cernay, Haute Alsace, 21 April 1852. He was educated at Colmar, Alsace, and at Saint Sulpice and the Sorbonne, Paris. In 1873 he joined the French Oratorians and three years later was ordained to the priesthood. He was successively librarian, archivist and professor of history and exegesis in the Paris scholasticate. Since 1899 he has been editor of the *Revue d'Alsace*. In 1914 he was made chaplain to the 30th Army Division. He has published about 200 works on Jansenism, Alsatian history and the history of the Oratorians. He collaborated in Vacant's, 'Dictionnaire de Théologie Catholique'; Vigouroux's 'Dictionnaire de la Bible'; Bandrillart's 'Dictionnaire d'histoire et de géographie ecclésiastiques'; and Cabral's 'Dictionnaire d'archéologie chrétienne et de liturgie.' He contributed to 'The Catholic Encyclopedia' and with Duchesne founded the *Bulletin Critique*.

INGOLDSBY LEGENDS, The, or MIRTH AND MARVELS (1837–40), by the Rev. Richard Harris Barham ("Thomas Ingoldsby"), a collection of tales, mostly versified and nearly all laughable, sets the standard for its kind. Other English humorous narrative verse may equal or surpass it in one quality or another — Thackeray's 'Ballads' in the delightful employment of vulgarisms; 'John Gilpin' and the 'Elegy on a Mad Dog' in simplicity; the 'Ballads of Bon Gaultier' in thinly veiled satire; 'Hudibras,' 'The Fable for Critics,' and much of Browning's serious verse in *tours de force* of whimsical rhyming; the 'Bab Ballads' in *bouffe* irresponsibility of theme and in sureness of rhythm; Thomas Hood's poetical tales in the mingling of grim pathos with humor; but none other combines these qualities so uniformly and in so large a body of verse. Ingoldsby has other merits of its own. Its verve is unfailing. Its literary sources are extraordinarily various, ranging from saints' legends, mediæval chronicles and Kentish local traditions, down to La Fontaine's 'Contes,' Goethe's 'Zauberlehrling,' and De la Motte Fouqué's 'Undine'; so that it offers the richest antiquarian farrago of witchcraft,

ghosts, magic, and demonology, with legal, genealogical, heraldic, ecclesiastical, and gastronomic history and anachronisms. Its careful technique in the details of narrative and description is in the tradition of Sterne; and its rollicking masculine fun is the peculiarly English fun of a by-gone day of roast-beef, puddings, and ale, a hierarchical social order, and a gentlemanly acquaintance with the classics. Its defects are the often flippant handling of themes essentially serious; the rarity of its genuine wit or humor — their place being generally occupied by fun and volubility; its employment of digression beyond the point where digression ceases to amuse and begins to bore; and its outworn insularity and prejudices. These penalties it pays for smacking so racily of its time and its land; Ingoldsby takes the gauge of early Victorian England relaxing over the nuts and wine; yet, all deductions made, does it so excellently well as to make itself the permanent model of its *genre*. Various editions are illustrated by Cruikshank, and by Leech and Tenniel. Early issues are now in request. Consult 'The Life and Letters of the Rev. Richard Harris Barham,' by his son, R. H. D. Barham (London 1870).

SAMUEL LEE WOLFF.

INGOLSTADT, Bavaria, town situated at the confluence of the Danube and the Schutter, 52 miles north of Munich. It contains an ancient ducal palace, now used as an arsenal, old university buildings, theatre, a Gothic Frauenkirche, a Franciscan convent and nunnery, ammunition works, a school of military engineering, gun powder works, cloth factories and breweries. It was a royal villa in the 9th century and received its charter as a town before 1255. In 1539 it was fortified. It suffered severely in the wars incident to the Reformation; was ceded to Austria in 1743 and in 1800 was taken by the French and its fortifications were dismantled. Since 1870 it has ranked as a fortress of the first-class and improved defensive works have since been erected. Pop. 23,745. Consult Gerstner 'Geschichte der Stadt Ingolstadt' (Munich 1853).

INGOT, a small bar of metal formed by casting it in molds. The term is chiefly applied to the bars of gold and silver intended for coining, although both iron and steel are molded into ingots.

INGRAHAM, ĭng'grą-ăm, **Duncan Nathaniel,** American naval officer: b. Charleston, S. C., 6 Dec. 1802; d. there, 16 Oct 1891. He entered the navy as midshipman in 1812, served during the War of 1812 and in the Mexican War before Vera Cruz and Tampico, and became a captain in 1855. While in command of the sloop-of-war *Saint Louis* he arrived at Smyrna 22 June 1853, and under instructions from the American Minister at Constantinople, took action in the case of the illegal arrest by order of the Austrian counsel, of Martin Koszta, an American citizen of Hungarian birth, which assumed considerable international importance. (See KOSZTA AFFAIR). After his return he acted for more than four years as chief of the bureau of ordnance and hydrography of the navy department. In 1860 he resigned from the United States Navy, entered the Confederate service and became a commodore, serving as chief of ordnance at Richmond, Va., and as naval commander at Charleston, S. C.

INGRAM, ĭn'grăm, **Arthur Foley Winnington,** Anglican bishop: b. 26 Jan. 1858, Worcestershire, England. He was educated at Marlborough College and Keble College, Oxford. He was a private tutor 1881–84; the next year he served as curate of Shrewsbury; 1885–89 he was private chaplain to the bishop of Litchfield; in 1889 he was chaplain to the archbishop of York and to the bishop of Saint Albans, at the same time he was head of Oxford House, Bethnal Green; rector of Bethnal Green 1895; rural dean of Spitalfields, 1896; canon of Saint Paul's, London, 1897–1901 and bishop of Stepney for the same period. Since 1901 he has been dean of the Chapels Royal and bishop of London. He has a wide reputation as a preacher. He is author of 'Work in Great Cities' (1895; 5th ed. 1909); 'The Men who Crucify Christ' (1896); 'Christ and His Friends' (1897); 'Banners of the Christian Faith' (1899); 'The Gospel in Action' (1906); 'Early English Colonies' (1908); 'Joy in God' (1910); 'Secrets of Strength' (1911); 'Attractiveness of Goodness' (1913); 'Eyes of Flame' (1915); 'Church in Time of War' (1916); 'Day of God' (1916); 'Gospel of the Miraculous' (1916); 'Under the Dome' (1916); 'Call of the Father' (1917); 'Potter and the Clay' (1917).

INGRAM, John Kells, English educator and author: b. County Donegal, Ireland, 7 July 1823; d. Dublin, 1 May 1907. He was educated at Trinity College, Dublin, and was appointed professor of oratory and English literature there in 1852, Regius professor of Greek in 1866, and librarian in 1879. At one time he was vice-provost of the college, and also held the presidency of the Royal Irish Academy. His 'History of Political Economy,' originally printed in the 9th edition of the 'Encyclopædia Britannica,' was separately published in 1888 and widely translated. He further wrote 'A History of Slavery and Serfdom' (1895); 'Sonnets and other Poems' (1900); 'Human Nature and Morals according to Auguste Comte' (1901), etc.

INGRASSIA, Giovanni Filippo, Sicilian physician: b. Palermo, 1510; d. there, 6 Nov. 1580. He studied at the University of Padua, where he received the degree of doctor in medicine in 1537. He taught with great success in Naples. He made several important anatomical discoveries. In 1563 he was named first doctor of Sicily by Philip II of Spain, and during the pestilence which devastated Palermo in 1575 he acquired the lasting esteem of its citizens by his work in suppressing the plague. He was granted a pension of 3,000 gold crowns. His more important works are 'Jatropologia, liber quo multa adversus barbaros medicos disputantur' (1558); 'De tumoribus præter naturam' (1553); 'Ragionamento sopra l'infermità epidemica del 1558' (1560); 'Methodus curandi pestiferum contagium' (1583); 'In Galenum librum de ossibus doctissima et expertissima Commentaria' (1603). Consult Eloy 'Dictionnaire historique de la Médicine.'

INGRES, Jean Dominique Auguste, zhŏn dō-mē-nēk ō-güst ăng-r, French historical

painter: b. Montauban, 29 Aug. 1780; d. Paris, 14 Jan. 1867. Placed in the school of David he made such rapid progress that in 1800 he gained the second, and in 1801 the first prize of the Academy of Fine Arts. In 1806 he departed for Italy, where he passed nearly 20 years first at Rome and then at Florence, abandoning, under the influence of a close study of Raphael and the old masters, the dry, classic style acquired from David. After his return to Paris he opened, about 1824, a studio where he taught. From 1834–41 he was director of the French Academy at Rome. In 1845 he was made a commander and in 1855 a grand officer of the Legion of Honor. In spite of these honors, he was at times excessively attacked on account of his artistic principles. His works are numerous, and comprise generally serious historical and classical subjects; in the great exhibition of 1855 at Paris an entire salon was appropriated to them and he was awarded a gold medal. Many are in Louvre, on the ceiling of one of the apartments of which is painted his 'Apotheosis of Homer.' He painted the portraits of many distinguished personages, including that of Napoleon I. The art of Ingres is adjudged to hold a middle place between the classic and the romantic schools. His weakest point was his coloring, his strongest his drawing. Amongst his best known works are 'Œdipus and the Sphinx'; 'Christ Delivering the Keys to Saint Peter'; 'The Sleep of Ossian'; 'The Triumph of Romulus'; 'The Vow of Louis XIII'; 'Francesca da Rimini'; 'Joan of Arc at the Coronation of Charles VII'; Portraits of Cherubini, Charles X, himself, etc. Consult Amaury-Duval, E. E. P., 'L'Atelier d'Ingres' (Paris 1878); Blanc, C., 'Ingres. Sa Vie et ses Ouvrages' (Paris 1870); Boyer d'Agen, R., 'Ingres d'après une Correspondance inédite' (Paris 1880); Chesneau, E., 'La Peinture Française au 19e Siècle, etc.' (Paris 1862); Cortissoz, R., 'Art and Common Sense' (New York 1913); Delaborde, H., 'Ingres, etc.' (Paris 1870); La Forge, A. de, 'La Peinture Contemporaine en France' (Paris 1856); Lapauze, H., 'Ingres, Chef d'École, 1824–34' (in *Nouveau Revue*, Ser. III, Vol. XX, p. 453, Vol. XXI, p. 19, Paris 1911); id., 'Ingres dans l'Atelier de David, etc., 1797–1806' (in *Grande Revue*, Vol. LXVI, pp. 72, 304, 749, Paris 1911); Merson, O., 'Ingres' (Paris 1867); Mirecourt, E. de, 'Ingres' (Paris 1856); Mommeja, J., 'Collection Ingres au Musée de Montauban' (Paris 1905); Moore, G., 'Modern Painting' (London 1893); Saunier, C., 'Exposition Ingres' (in *Les Arts*, Paris, July 1911); Silvestre, T., 'Les Artistes Français' (Paris 1878); Wyzewa, T. de, ed., 'L'Œuvre Peint de J. D. Ingres' (Paris 1907).

INHALATION, in medicine, a mode of applying remedies directly to the respiratory tract. Either steam alone, steam charged with drug-vapors, or drugs finely subdivided in sprays, are breathed into the air-passages as deeply as possible. This method of medication is useful only in relieving inflammations of the upper air-passages and possibly the trachea and larger bronchi. The air in the smaller bronchi is not changed by breathing, but by the diffusion of gases, so that substances in aërial suspension are deposited on the surface before reaching the smaller divisions of the bronchial tubes. Steam does not penetrate far, but is cooled, and deposits moisture as far as the trachea. The old-fashioned croup-kettle and many devices for carrying out the same idea are used for the first stages of laryngitis. Many substances, such as tincture of benzoin, etc., are added to the boiling water, but render it no more efficacious. Instead of conducting the steam directly to the mouth and nose by a funnel or tube, it may be well to place the patient in a simply enclosed tent, formed of bedclothes, and to allow the steam to charge the confined air. This method is particularly advisable for infants and older children.

INHAMBANE, e'nyam-ba'na, Portuguese East Africa, a station on the coast just south of the tropic of Capricorn. It has very many European buildings, churches, etc., and dates from the 16th century. It has a trade in ivory, copal, wax, nuts, rubber and other products of the colony. Pop. 4,000, a motley collection of Arabs, Banyans, half-castes and negroes, with about 150 Europeans.

INHERITANCE, *in law*, a perpetual or continuing right to an estate invested in a person and his heirs. There are nine "canons of inheritance"; three may be quoted: (1) That inheritance shall, in the first place, descend to the issue of the last purchaser in *infinitum;* (2) that the male issue shall be admitted before the female; (3) that where two or more of the male sex are in equal degree of consanguinity to the purchaser, the eldest only shall inherit, but the females of the same degree all together.

INHERITANCE TAX, an assessment laid upon those made heirs of property, either by distribution or descent. Sometimes this assessment is confined to collateral heirs, when it is called collateral inheritance tax. The raising of public funds in this way has been sanctioned by legislation from the beginning of Roman law, and in England and other countries is a large and steady source of revenue, although such taxes have been stigmatized by certain economists as "death duties." During the Civil War taxes of this kind were made part of the internal revenue system of the United States, but abolished soon after the struggle ended. The rate and method of assessment vary in different countries, and in different States of the Union. The English inheritance tax ranges from a 1 to a 10 per cent assessment, in accordance with the amount of the inheritance and the degree of relationship of heirs. In the United States lineal, collateral and succession inheritance taxes have been instituted in several States, as a source of domestic revenue. In Connecticut the assessment on inherited property is graded from 1 to 8 per cent, according to degree of relationship and valuation. In California, there is $10,000 to $24,000 exemption to near relatives, and then a graded tax from 1 to 15 per cent; distant relatives, $2,000 exemption and 3 to 25 per cent tax. In Delaware the assessment ranges 1 to 5 per cent, according to the amount of property left, and the degree of relationship. In Illinois, 1 per cent on values over $20,000 to lineal descendants; 2 per cent above $100,000, and 2 per cent to 5 per cent on all amounts to collateral relations. In New York, near relatives exempt to $5,000; 1 to 4 per cent on

larger bequests; non-relatives exempt to $1,000, above that graded from 5 to 8 per cent. In Ohio and Virginia, near relatives exempt, others 5 per cent on all values over $500. Nearly similar laws exist in Maryland, Missouri, New Hampshire, Pennsylvania, Vermont, Virginia and Delaware. In Alabama, District of Columbia, Georgia, Mississippi, New Mexico, Rhode Island and South Carolina, there is no inheritance tax. The tendency to place a large tax on bequests to near relatives is illustrated by the laws of Arkansas, where it is 24 per cent on $1,000,000; Idaho, 15 per cent on $1,000,000; Indiana, Wisconsin and West Virginia, 15 per cent on $500,000; Nevada, 25 per cent above $500,000; North Carolina and North Dakota, 15 per cent above $50,000; Texas, 12 per cent above $500,000, and Washington, 12 per cent above $100,000. Inheritance laws have in the United States occasioned much discussion and litigation, but their justice and utility have been testified to by experience and the decision of the law courts. The economists of the present and other periods have seen the scientific propriety of such legal provisions, and have noted the uniformity with which they deal with all classes of the financial community.

INHIBITION, (1) a writ from a higher to a lower court, as an ecclesiastical court in England, forbidding further proceedings; also, in English law, a command, as from a bishop, to a minister to cease performing ministerial functions. (2) In Scots law, an order restraining an heir from contracting debts affecting injuriously the rights of others in the heritable property. It is sometimes used also in Scots law in the sense of an order secured by a husband forbidding the giving of credit by another to his wife. It was formerly used in English law as synonymous with writ of prohibition.

INIA, a genus of toothed cetaceans similar to dolphins, but placed on structural grounds in the allied family *Platanistidæ,* with the freshwater dolphins of the Ganges and the La Plata. The single species (*I. geoffrensis*) is called bouto and tucuxi, and is found in some of the upper tributaries of the Amazon, and in the lakes near the Cordilleras. It measures about eight feet in length, has a long cylindrical snout with stiff hairs, and a very slight dorsal fin. It feeds chiefly on fish, and is hunted for the sake of its oil.

IÑIGUEZ. See GARCIA IÑIGUEZ.

INITIAL DIP. See DIP.

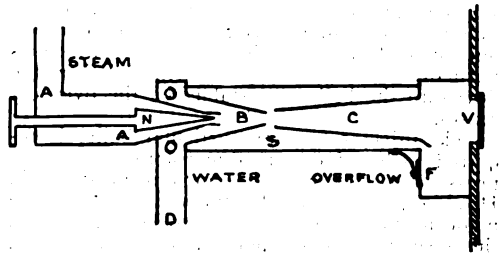
INITIATIVE. The initiative and the optional referendum, which originated in Switzerland, were introduced in the United States to obtain for the voters as a whole a more direct participation in legislation and a more immediate control of the business of government; the movement gained headway rapidly because the opinion prevailed in many sections that State legislatures were no longer representative of the people but were dominated by political rings and moneyed interests. While the referendum (q.v.) is effective in killing pernicious legislation and acts as a preventive to the enactment of such laws, the initiative affords a remedy for a legislature's indifference to public needs and its persistent refusal to pass legislation urgently required, if opposed by a corrupting lobby or other hidden influences. The initiative has long been in operation in Switzerland, originating in the "direct democracies" of the smaller cantons where any voter may require that his proposition be submitted to popular vote. In the larger cantons a certain proportion of the voters must favor the initiation of a legislative measure before it can be placed before the electors. In 1891 the Confederation adopted the initiative as a method of proposing constitutional amendments. The method was first introduced in the United States by South Dakota in 1898, but its principal use has been in Oregon which State in 1902 adopted a constitutional amendment providing that upon petition by at least 8 per cent of the electors who voted for justice of the Supreme Court at the last regular election (which petition must be filed with the Secretary of State four months before a general election), a proposed measure must be submitted to popular vote and must become law if favored by a majority of those who voted upon the measure. In 1901 Illinois passed a law stipulating that upon petition of 10 per cent of the registered voters, a given proposal, such as a "question of public policy" must be submitted to the voters of the whole State. Delaware and other States have enacted similar laws, which might be termed an "advisory initiative." These States were followed by Nevada (1905 and 1912), Montana (1906), Oklahoma (1907), Maine (1908), Missouri (1908), Arkansas (1910), Colorado (1910), Arizona (1911), California (1911), Nebraska (1912), Washington (1912), Idaho (1912), Ohio (1912), Michigan (1913), North Dakota (1914), Mississippi (1916), while Utah (1900) and Idaho (1912) provided for it but their legislatures have not passed the necessary enabling acts. New Jersey is experimenting with the system in cities, and Minnesota rejected it in 1916. In some States the practice is limited to the initiation of ordinary legislation but in other States constitutional amendments may be proposed in the same way, while most States have coupled this measure with the referendum, which provides for submission of the proposed legislation to popular vote. The initiative and referendum have taken their places beside direct primaries, the presidential preference primary, the recall of elective officials, woman suffrage, the short ballot, etc., as an effective means of enforcing the popular will as opposed to that of political bosses; but the initiative is somewhat difficult and cumbersome in its operations and, save in Oregon, has been sparingly employed. While in many States a large portion of the laws subjected to popular vote have been defeated, in Oregon nearly 50 per cent so submitted have been ratified, including a corrupt practices act, a general direct primary law, a workmen's compensation law, and others of vast importance. (See REFERENDUM; RECALL; ELECTIONS; PRIMARY, DIRECT). Consult Beard, C. A., and Schultz, B. E., 'Documents on State-wide Initiative, Referendum and Recall' (New York 1912; gives text of laws of various States); and the bibliography given under the article REFERENDUM.

INJALBERT, an'zhal'bar, **Jean Antoine,** French sculptor: b. Béziers, 1845. He received his artistic education under Dumont and in 1874 was awarded the Roman Prize for his 'Douleur d'Orphée.' In 1877 he exhibited at

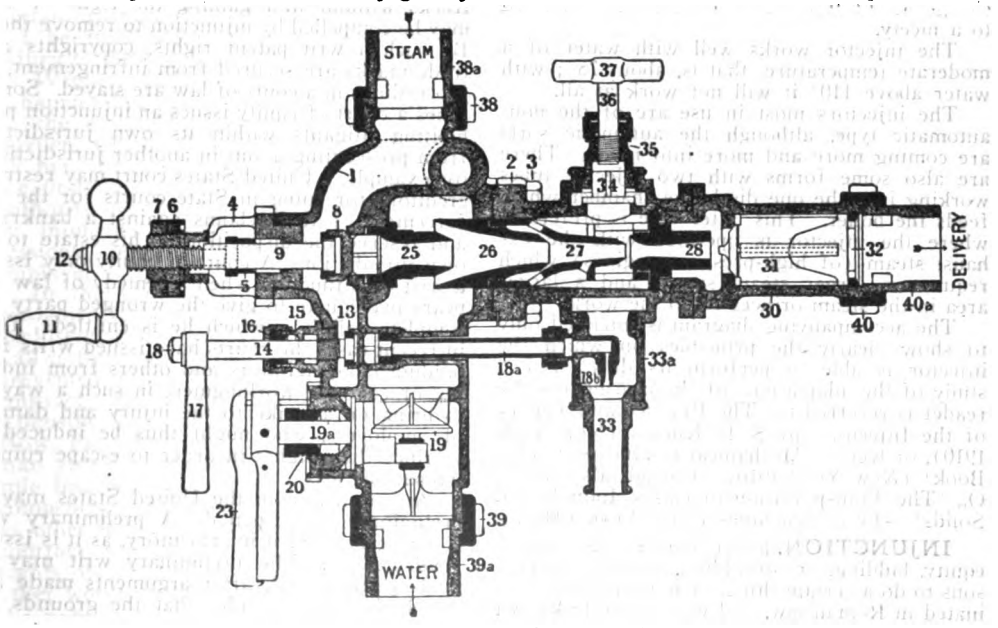
the Salon a huge bas relief 'La Tentation,' and in the following year a 'Christ on the Cross,' now in the Rheims Museum. Injalbert has the gift of imparting life to his work and a wonderfully rich imagination. His 'Titian' surmounts a great fountain at Béziers. His 'Hippomène' is in the Luxembourg. Other works are 'L'Hérault, l'Orb, le Lez,' in the vestibule of the prefecture of Montpellier, the two groups of 'Enfants aux lions' also in Montpellier; the façade of the theatre of Béziers; figures on the Pont Mirabeau of Paris; the Moliere monument at Pézenas; the 'Fronton du Petit Palais' at the Paris Exposition of 1900.

INJECTOR, a mechanism for feeding water into a steam boiler while it is in operation, through the force of its own steam. The action of this device is based on that principle of hydrodynamics in virtue of which the velocity of a moving body of water or other liquid may be transmuted into pressure, and vice-versa, by proper arrangements of conduits and apertures.

In the injector a jet of steam, issuing from the boiler at a velocity of from 1,500 to 3,500 feet per second (depending upon the boiler pressure), is passed through a conical nozzle, indicated in the diagram by the letter A, from which it passes into another cone-shaped tube B. The open space O around the cone A is connected freely with the water-supply pipe D. This space may be filled with water by gravity from a reservoir above its level; or the action of the injector may be so arranged that through the exhausting of the air in B and O by the jet of steam a vacuum is produced and water may be thus "sucked" up from a well below, if the lift is not more than 15 to 18 feet. The rush of steam through the conical "combining tube" B drags along with it a conical shell of water lying next the walls of B and encasing a cone-shaped body of steam in its centre. As the



moving steam and water are choked at the apex of B, the steam is compressed, in part condensed and in part absorbed by the water, which takes up its velocity to a large degree and rushes into the apex of the conical tube C. Here the flare of the cone is in the opposite direction and as the column of water moves forward into this tube its velocity lessens as the tube grows larger, and is resolved into pressure, which presently becomes greater than the steam pressure in the boiler by which the



MONITOR INJECTOR WITH NAMES OF PARTS.

1. Body (back part)
2. Body (front part)
3. Body Screw
4. Yoke
5. Yoke Gland
6. Yoke Packing Nut
7. Yoke Lock Nut
8. Steam Valve Disc and Nut
9. Steam Valve Spindle
10. Steam Valve Handle
11. Steam Valve Rubber Handle
12. Steam Valve Top Nut
13. Jet Valve Disc and Nut
14. Jet Valve Spindle
15. Jet Valve Bonnet and Nut
16. Jet Valve Gland
17. Jet Valve Lever Handle
18. Jet Valve Top Nut
18a. Jet Tube
18b. Lifting Nozzle
19. Water Valve
19a. Eccentric Spindle
20. Water Valve Bonnet
23. Water Valve Lever Handle
25. Steam Nozzle
26. Intermediate Nozzle
27. Condensing Nozzle
28. Delivery Nozzle
30. Line Check
31. Line Check Valve
32. Stop Ring
33. Overflow Nozzle
33a. Overflow Chamber with Nut
34. Heater Cock Check
35. Heater Cock Bonnet and Nut
36. Heater Cock Spindle
37. Heater Cock T Handle
38. Coupling Nut, Steam End
38a. Tail Piece, Steam End
39. Coupling Nut, Water End
39a. Tail Piece, Water End
40. Coupling Nut, Delivery End
40a. Tail Piece, Delivery End

check valve V is kept closed. The valve V then opens and permits the water in C to flow through. At this instant the varying pressures throughout the injector come to an equilibrium, based on the condition of that pressure at which the water flows freely from the injector into the boiler — and that condition continues indefinitely as long as the steam pressure in the boiler remains uniform. Previous to the establishing of the steady flow, that is, before sufficient pressure obtains, steam and water escape into the casing space S and make their way out through the overflow valve F, which is normally held closed by a spring. When the flow into the boiler is established the overflow ceases.

The injector for any particular boiler is required to be of certain dimensions to suit the pressure of steam with which it must work. However, there are adjustments which may be made to cover the variations to be expected in the normal use of the boiler in question. Thus, steam issuing at the boiler pressure of 65 pounds may be made by the proper configuration of the conical tubes of the injector to exert a pressure of 90 pounds at the check valve into the boiler. While this pressure is too high for the feeding in of a normal supply of water — that required to replace the water which the boiler evaporates into steam from hour to hour — the pressure in the injector may be modified to a degree by the needle valve N in the steam supply pipe, and the discharge of the injector into the boiler regulated to a nicety.

The injector works well with water of a moderate temperature, that is, about 75°; with water above 110° it will not work at all.

The injectors most in use are of the non-automatic type, although the automatic sorts are coming more and more into favor. There are also some forms with two injector tubes working into the one discharge chamber which feeds the boiler. This latter type is preferable where the injector is operated with the exhaust steam (of high-pressure engines) which requires a larger steam supply and a larger area in the steam orifices to do the work.

The accompanying diagram is intended only to show clearly the principles on which the injector is able to perform its duty. For a study of the adaptations of these principles the reader is referred to 'The Practice and Theory of the Injector,' by S. L. Kneass (New York 1910), or Kent's 'Mechanical Engineers' Pocket Book' (New York 1916). Consult also Nagel, O., 'The Transportation of Gases, Liquids and Solids' — by jet machines (New York 1909).

INJUNCTION, a writ issued by a court of equity, bidding, or forbidding, a person or persons to do a certain thing. The injunction originated in Roman law, and was anciently known as an interdict, a name it still bears in Scottish practice. It was introduced as a remedy for some of the abuses of common law, and as a preventive, when evasion of common law provisions seemed possible. It is to-day one of the most potent of the legal remedies of an equitable character which stand on the statute books.

There are three main divisions in the purposes for which a writ of injunction is issued. A writ may be prohibitive, protective, or restorative. In the first place it may forbid the commission of certain acts of a civil nature which are charged with injustice. Second, it may be so framed as to protect such civil rights of an individual or a corporation as seem to be threatened. Third, it may order the restitution or restoration of such rights as have unlawfully been taken away from an individual or a corporation. These characters of the writ have been clearly expounded by Blackstone, as follows:

"This writ may be had to stay proceedings at law, whatever stage they may have reached; to restrain alienations of property *pendente lite*, and tenants for life and others having limited interest from committing waste. It may be granted to restrain the negotiation of bills of exchange, the sailing of a ship, the transfer of stock, or the alienation of a specific chattel, to prohibit assignees from making a dividend, to prevent parties from removing out of the jurisdiction, or from marrying, or having any intercourse, which the court disapproves of, with a ward. The infringement of a copyright or a patent frequently calls for the exercise of this beneficial process; which may also be had to restrain the fraudulent use of trade marks, or of the names, labels, or other indiciæ of the makers or vendors of goods and merchandise, and in a large class of cases, far too numerous to be mentioned here."

The first two kinds of injunction are most commonly used, and a familiar example of the prohibitory writ is that which orders the abatement of a nuisance. A railroad which lays tracks without first gaining the right of way may be compelled by injunction to remove them. By such a writ patent rights, copyrights and trade marks are secured from infringement, or proceedings in a court of law are stayed. Sometimes a court of equity issues an injunction prohibiting litigants within its own jurisdiction from prosecuting a suit in another jurisdiction; for example, a United States court may restrain creditors for suing in State courts for the enforcement of their claims against a bankrupt, and reserve the disposition of his estate to its own jurisdiction. A court of equity only issues a writ of injunction when a remedy of law appears inadequate to give the wronged party the complete relief to which he is entitled. Thus in recent cases the courts have issued writs forbidding labor agitators and others from inducing or coercing workingmen, in such a way as to bring on a strike to the injury and damage of employers, who might thus be induced to sacrifice their rights in order to escape ruin or irreparable loss.

An injunction in the United States may be preliminary or perpetual. A preliminary writ is sometimes styled interlocutory, as it is issued *pendente lite*. The preliminary writ may be made perpetual, if, after arguments made and heard, the court decides that the grounds advanced for the continuance are valid, and have been so proved by evidence. Failure to obey an injunction is punishable as a contempt of court (q.v.). Consult Beach, C. F., 'Treatise on the Law of Injunctions' (New York 1895); High, J. L., 'Treatise on the Law of Injunctions as Administered in the Courts of the United States and England' (Chicago 1905); Joyce, H. C., 'Treatise on the Law Relating to Injunctions' (3 vols., Albany 1909); Kerr, W. W., 'Treatise on the Law and Practice of Injunctions' (4th ed., London 1903).

INJUNCTION, Government by. See GOVERNMENT BY INJUNCTION.

INJUNCTION, Theatrical, a term applied to a mandate issued by a court of equity, to compel or prevent the performance of some act for which money damages would not properly compensate the injured party. Relief by injunction in matters pertaining to theatricals is probably more frequently sought than in any other business or profession, and precedents in law established in this class of cases have become of considerable importance. At first, courts of this country and England refused to grant injunctions against actors for the purpose of compelling them to perform their contracts, a learned justice saying: "The court could not regard as law the old adage that 'a bird that can sing and will not sing must be made to sing.'" But latterly, when the service of an actor became recognized and it was made to appear clearly that an actor or singer, by intelligence, education and other artistic accomplishments and talents, was of extreme importance to one who had invested money in the production of a play or opera it was held that a court of equity would by injunction enforce a covenant in a contract. But this has simply gone to the extent of compelling a fulfilment of the contract, or forcing the artist to remain idle during its term. The services of every actor will not be enjoined. He must actually possess some exceptional merit, so that his services may be termed special, unique and extraordinary, and it must be shown they cannot be fulfilled by any other person. without injury to the employer. In the case of Lumley *v.* Wagner, the courts of England enjoined Johanna Wagner, a prominent prima donna of the early 50's from appearing at Covent Garden Opera House, London, in violation of her contract with Lumley; and then for the first time the British courts asserted their authority over contracts of actors, and granted an injunction forbidding her rendering professional services for any but her original employer.

In the United States, the Federal courts recognized the right of a manager to have the exclusive services of his employee, and in McCall *v.* Braham an injunction was granted which prevented Lillian Russell from violating her contract. In the State courts, the case of Augustin Daly *v.* Fanny Morant Smith (49 How. Pr. 150), Superior Court Justice Freedman also appreciated the fact that the ancient rule had been abrogated and the modern one compelling actors to live up to their agreements, as other individuals, was there enforced. The contract must unquestionably be fair. The rights of both parties to it must be equal. In other words, if the contract gives the manager the right to terminate it by giving notice before the expiration of the contract, a like right of termination must also be given the actor; and as stated before, the actor's services must be special, unique and extraordinary. In this latter connection, it seems uncertain where to draw the line. In the case of Carter *v.* Ferguson the court refused to grant an injunction to Mrs. Leslie Carter against William J. Ferguson, an actor, saying that his services were not so special and unique as to warrant a court of equity's interference. In Charles Hoyt *v.* Loie Fuller, the court granted an injunction against the dancer, holding that a serpentine dance in the performance of which she became famous, warranted the court's interference by injunction. In George Edwardes, the London manager, *v.* Cissie Fitzgerald, the New York Supreme Court granted an injunction against Miss Fitzgerald, on the theory that a certain wink of her eye used in a play was of special merit, and a drawing card. In Harris *v.* Sparks, an injunction was granted against John Sparks, the Irish comedian, the ground being that his portrayal of an Irish character was special, unique and extraordinary. While in the still later case of Shubert Brothers *v.* Aimee Angeles, imitations given by the performer were considered so special, unique and extraordinary as to warrant the granting of an injunction. Each case, however, must be determined by its own peculiar circumstances. In the Harrison Grey Fiske *v.* Tyrone Power case, the court refused to grant an injunction against Tyrone Power, although his ability as an actor was exploited in the newspapers, on the ground that his services were not so special, unique and extraordinary as to justify an injunction. But in guarding the rights of an actor, the courts will see that no advantage has been taken of him by the manager, and that the manager for whom he is to perform is of such financial responsibility as to insure the salary of the actor. In the case of Rice *v.* D'Arville, Edward E. Rice, the theatrical manager, sought to restrain Camille D'Arville from performing for others; but on the defense that Rice was insolvent and indebted to her on a previous contract, Justice Oliver Wendell Holmes, then of the Massachusetts Supreme Court, would not compel her to perform for Rice.

Injunctions in the theatrical profession are not confined to actors and actresses, but are often invoked to prevent the piracy of a play or the use of a name. Where a play or a scene from a play has been copyrighted, the Federal courts alone have jurisdiction of the matter, and will by injunction prevent anybody from performing or producing it as their own. When there has been no copyright the common law protects the work, as well as its title; and the use of a similar name, or a name which is apt to deceive the public into the belief that it is the one already used by an author, will likewise be enjoined. An instance is the case of Charles Frohman *v.* Arthur Fraser, where the use of the title "Sherlock Holmes" was enjoined, this name having been adopted by William Gillette as the title of a play, notwithstanding the name had been used by A. Conan Doyle as the title of his novel. In that case the court held that Mr. Gillette having first used the name in connection with a theatrical production was entitled to all emoluments arising from it. Notwithstanding the numerous attempts to avoid the principles of law applicable to this class of cases, it matters not whether it is the actor who is involved or the theatrical manager, the American courts are humane, equitable, just and careful, and invariably zealously guard the interests of those engaged in the theatrical profession, as well as those engaged in any commercial business. See INJUNCTION; GOVERNMENT BY INJUNCTION; COURT; EQUITY; CHANCERY; CONTEMPT; LAW, etc.

INJURIES, Industrial. See ACCIDENTS, CAUSES AND PREVENTION OF; WORKMEN'S COMPENSATION.

INJURY, in law, an act by which the rights of another person or of the state are violated and for which the party whose rights are so invaded may institute action for damages against the perpetrator. Wrongs called *damna absque injuria* are those acts while injuring another do not permit the latter the right to enter an action, there being no remedy for such acts. See CRIME; CRIMINAL LAW; EQUITY; TORT.

INK, a colored liquid used for writing and printing. It comprises various classes, as writing and copying, black or colored, India, printing and lithographing inks.

For long ages past the best black writing-ink has been made by mixing together solutions of nutgalls and of ferrous sulphate of iron, known as green vitriol, and holding in colloidal suspension, by aid of a gum, the colored substance produced. The gallo-tannic acid present in a freshly prepared solution of galls, upon exposure to the air, changes gradually largely into gallic acid, and the protoxide of iron changes into peroxide. The color of this changed product is much deeper than that of the original mixture. It has been found that the permanency of the writing is greater if the ink is used before this conversion is fully completed. The change is held in check by having present in the ink a slight amount of some free volatile acid, such as hydrochloric. The trace of acid also serves to hold the iron color in the state of colloidal suspension or solution. The moulding to which such an ink is liable is checked by adding to it a trace of some antiseptic, such as carbolic acid. All known commercial substitutes hitherto used for nutgalls in black writing-ink produce a fluid somewhat inferior to that from nutgalls.

An exhaustive scientific investigation of the chemistry of ink to determine the best ingredients and the proportions to be used of the same for the producing of the most permanent black writing-ink has been made in Germany by Osw. Schluttig and Dr. G. S. Neumann, and published in their work on 'Die Eisengallustinten,' issued by Zahn & Jaensch of Dresden in 1890. Their conclusions were followed in preparing the specifications for the official "Standard Record Ink" required under the laws of Massachusetts to be used on all the public records in that State. The same specifications have since been adopted by the United States Treasury for the ink used in that department. This ink has also been adopted by the Danish government for its official records. The specifications, which were prepared by Dr. Bennett F. Davenport of Boston, as ink expert for the State of Massachusetts, it is to be noted are for the required quality of the ink, and not for the compounding of it. The specifications are as follows:

It must be a gallo-tannate of iron ink, not inferior in any essential quality to a typical standard for comparison which has been properly prepared after the following formula, in which all the ingredients are of the quality prescribed by the United States Pharmacopoeia, and the per cent of true acid present in the sample of tannic acid used has been determined by the Loewenthal and Schroeder method.

Take of pure, dry Tannic Acid, 23.4 parts by weight; crystal Gallic Acid, 7.7 parts; Ferrous Sulphate, 30.0 parts; Gum Arabic, 10.0 parts; diluted Hydrochloric Acid, 25.0 parts; Carbolic Acid, 1.0 part; Water, sufficient to make up the mixture at the temperature of 60° F. to the volume of 1000. parts by weight of water.

Inks submitted will be subjected to the following tests, as compared with the typical normal standard ink described above: (1) A fluid ounce allowed to stand at rest in a white glass vessel, freely exposed in diffused daylight for two weeks to the light and air, at a temperature of 50° to 60° F., protected against the entrance of dust, must remain as free from deposit upon the surface of the ink or on the bottom or sides of the vessel. (2) It must contain no less iron, and must have a specific gravity of 1.035 to 1.040 at 60° F. (3) It must develop its color as quickly. (4) After a week's exposure to diffused daylight the color must be as intense a black when used upon the standard record paper, and it must equally resist changes from exposure to light, air, water, or alcohol. (5) It must be as fluid, flow as well, strike no more through the paper, nor remain more sticky immediately after drying.

To such an ink a slight amount of some one of the water soluble coal-tar colors is usually added to give the desired initial color to the ink when used in writing.

Cheaper grades of black writing-ink are produced by substituting for the nutgalls other tannin containing substances, or by using logwood. In these other iron salts, or salts of other metals are sometimes used, as of copper, aluminum or chromium. For special purposes some of these have certain advantages. For copying, for instance, the ink made from logwood with alum cake and chromate has the highest efficiency known. This ink, however, fades out after a few years' exposure to the open air and daylight.

Within modern times colored liquid solutions have come much into general use as inks, made up with aniline and other dyestuff colors. They are easily and cheaply made, flow nicely from the pen, and allow of a great variety as to choice in coloring, but none of them have the permanency of the ancient nutgall iron ink on exposure to light and air.

The usual basis of commercial marking inks, for use on textile fabrics, is some salt of silver. The permanent color of this ink is developed through the action of light, heat or some chemical, after the ink has been applied. The usual basis of India ink is an exceedingly finely divided solid carbon, mixed with a size to hold it in suspension when the ink is prepared for use by being ground up with water. (See INDIA INK). Printing ink consists of dry pigment, black or colored, ground very fine and mixed with varnish and a few minor chemicals as it may be desired for various purposes. For black printing ink, lampblack and linseed oil were originally employed, but gas-black has taken the place of the former, and the scarcity and high cost of linseed oil has led to much substitution; one of the most common is rosin oil. For pigments, the inorganic or earthy bases are preferred, but of late years a line of coal-tar products has been evolved that yield exceedingly brilliant colors though less permanent than the earth bases. Pigments require very careful grinding. The mills are water-cooled, but nevertheless heat under the pressure and friction on the rolls when grinding is continued too long, to remove the last vestige of grit; the ink thickens, and becomes so pasty that it has to be thinned down before it will flow through the fountain of a printing press. This thinning process tends to lighten the color, that is render a dense black slightly gray. Manufacturers of printing inks are required to produce very thin, cheap ink for rapid printing on newspaper presses, and whole series of better

grades of black adapted to presses operating at speeds varying from 500 to 20,000 impressions per hour. They are also called upon to supply all conceivable shades of color in all qualities, and adapted to all varieties of paper. The result is an almost infinite number of grades and kinds of ink for typographic and lithographic work. The temperature of a press room much affects the working of ink. A desirable ink must not dry readily on the type from the ink rollers, but must dry quickly on the paper. To hasten drying, the ink makers insert material called a "dryer," and in recent years it is common in high-grade printing to pass the freshly printed sheet quickly over a gas flame to set the ink. Previous to the World War, the best colors for inks came from Germany. When importation ceased, American manufacturers set to work, and within two years a very fine large line of coal-tar colors of home make were on the American market.

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INK DRAWING. See ART DRAWING.

INKBERRY, or **WINTERBERRY,** an evergreen shrub (*Ilex glabra*) of the holly family native to the Atlantic coast from Massachusetts to Florida, also to Alabama and Mississippi. Its slender and flexible stems are two to four feet high and its leaves, about an inch in length, are lanceolate, of leathery texture, and present a shining upper surface. It bears small, very black berries which are valued for decoration. Formerly its bark and leaves were used medicinally, especially in fevers.

INKERMAN, ĭnk-ĕr-măn', Russia, a village on the site of a ruined town in the Crimea, at the head of the harbor of Sebastopol, 35 miles by rail southwest of Simferopol. It gives its name to the sanguinary battle fought on the heights overlooking the town, on 5 Nov. 1854, when the Russians unexpectedly attacking the British camp were repulsed with great slaughter, losing in killed 3,000 and in wounded 6,000, the loss of British and French allies being 850 killed and 3,500 wounded.

INLAND WATERWAYS. Detailed descriptions of the navigable streams, lakes, bays and canals of the United States are given elsewhere in this Encyclopedia under WATERWAYS OF UNITED STATES. Most of these waterways have been utilized for a long time, and in fact, had greater use in years past than under present conditions of competition of rapid railway service. However, the United States Congress in every session makes large appropriations in the River and Harbor Bill for waterway improvements and there is great general interest in providing suitable ship canals to develop water traffic in various directions. One of the most prominent projects is that of a continuous inland water route along the Atlantic Coast from Massachusetts to the Gulf of Mexico. The "Atlantic Deeper Waterways Association" with large and influential membership has yearly conventions (9th in 1916) to urge that the government should make provision for this project. The plan is to deepen canals now in existence and dig some new ones, about 131 miles in all at an estimated cost of $50,000,000. There can be no question as to the importance of such a waterway to facilitate coastwise commerce and in time of war it might be a most useful avenue for the movement of supplies especially if offshore traffic should be menaced by an enemy.

The advantage of such an inland route is well shown by the cost of shipwrecks along the Atlantic Coast in the decade from 1900 to 1910; it is estimated that there were 4,700 wrecks in this time with loss of 2,200 lives and destruction of about $40,000,000 of property. The unfortunate congestion of freight on railroads in 1916–18 has done much to revive interest in inland waterways and brought conviction that they are a necessary addition to our transportation facilities. Much of the desire for speedy transit of freight is unwarranted and wasteful of fuel and energy. Railways and waterways must work in accord. Suitable legislation can remove hurtful railroad competition so that capital can be safely invested in waterway projects with prospects of reasonable profits. Canada and New York State both present excellent object lessons of the great advantage of inland waterways for the development of local commerce. Europe with her many extensive canal systems has long since demonstrated the utility of waterways. Low cost of transportation is a most important factor in competition along nearly all commercial lines and many industries are crippled by expense of long land hauls of supplies or products. The low cost of wheat transportation mainly by water from the great fields of western Canada to Europe gives Canada considerable advantage in this item alone.

The Inland Waterways Commission created by President Roosevelt on 14 March 1907, consisted of Sen. Theo. E. Burton, Chairman, Sen. F. G. Newlands, Sen. Wm. Warner, Hon. John H. Bankhead, Gen. Alex. Mackenzie, W. J. McGee, F. H. Newell, Gifford Pinchot and H. Knox Smith. Its purpose was to prepare a report on a comprehensive plan for the improvement of the rivers of the United States to increase their usefulness as navigable waterways. The investigation of conditions for flood control and water power development were important features of the work. Various reports were prepared and Congress was recommended to make provision for various improvements, some of which have been incorporated in subsequent river and harbor bills. It is estimated that there are on the mainland of United States about 25,000 miles of navigated rivers and this amount could be doubted by improvement. There are 2,500 miles of canals, many thousand miles of regularly navigated waters in lakes and bays, and more than 2,500 miles of sounds, bays and bayous. Some of these water bodies can be connected by canals to form inner passages paralleling the Atlantic and Gulf coasts.

In the last few decades in the United States most inland waterways have not been economically successful excepting in giving access to certain ports. Long distance river and canal transportation under the blighting effect of railroad opposition has steadily declined. Most

of the canals have passed into the control of railroad companies and the rivers are closely paralleled by railroad lines. The general desire for fast freight service has had a powerful influence. Proper regulation of this competition and the deepening and other improvement of the waterways so that they can be utilized more economically will change this condition and they will become an important factor in cheap transportation. Canada with a 21-foot waterway from ocean to Great Lakes has a notable commercial advantage. The great railroad congestion in 1917–18 could have been avoided or greatly diminished by waterways suitable to carry part of our great freight burden. It has been estimated (by Mulhall) that in Europe there are more than 77,000 miles of navigated waterways of which 13,293 miles are canals, the latter costing considerably more than $1,000,000,000. South America has important inland waterways and for centuries China has had thousands of miles of canals which afford cheap transportation over a large part of the country. Floods are an adversary of river waterways, mainly in damage they cause to the channel but they can be controlled by reservoirs and reforestation. These latter features of development also have great economic advantage in affording water power and adding to lumber resources. Another incidental improvement in some areas is the drainage and reclamation of swamp lands, affording increased acreage for farming and bettering health conditions.

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INLAYING is the art of producing an ornamental surface by inserting varicolored forms and substances and reducing the whole to a smooth uniform condition, but with a pattern formed by the contrasting material introduced. Its essential difference from mosiac work (q.v.) is that mosaic is mainly made up of very small surfaces, while inlaid work is additional to a surface, as of wood on ivory, already existing, to add to its beauty. Various kinds of metal or wood, or pearl, ivory, etc., are employed in this process, which is now applied chiefly to the production of ornamental articles of furniture. When wood of one color is inlaid with others of different colors, as in ornamental devices in flooring, it is generally called parquetry, the various pieces of wood being usually disposed in regular geometrical figures. Marquetry or marqueterie is simply the French term for inlaying. The art of inlaying iron or steel with other metals, as gold or silver, is called damascening. Buhl and reisner work, once highly prized, have lost much of their celebrity. The former took its name from Buhl, an Italian resident in Paris in the reign of Louis XIV, and the latter was designated after Reisner, a German who not long after settled in the same city. Buhl for the most part inlaid brass on tortoiseshell, Reisner a dark wood on a tulip-wood ground. The usual instrument for cutting out veneers for inlaying is a fine saw, mounted in a bow or arched handle, and worked in short quick movements. Three or four veneers are sometimes cut simultaneously in this way. Inlaying with stone, in which the Florentines have long excelled, is called *pietra dura*, and differs from mosaic in having the holes not cut through the ground, which is commonly of black marble, but only to a regulated depth. An Indian variety of inlaying, in which the inlaid metal occupies more of the surface than that which forms the ground, is called *Kuftgari;* and in another variety, *Tutenague* or *Bederywork*, small pieces of silver are hammered into spaces previously cut in the ground, which consist of one part of copper to four of pewter, and is thus both hard and easily cut.

INLIER. See Outlier.

INMAN, Henry, American artist: b. Utica, N. Y., 20 Oct. 1801; d. New York, 17 Jan. 1846. From early boyhood he manifested a taste for art, and in 1814 J. W. Jarvis, the portrait painter offered to receive him as a pupil, and he was bound an apprentice for seven years. Upon the conclusion of his apprenticeship he devoted himself to portrait painting. In 1832 he married and settled at Mount Holly, near Philadelphia. He was one of the founders of the National Academy of Design and one of its vice-presidents. Among his most characteristic portraits are those of Chief Justice Marshall, Lafayette, William Penn, Martin Van Buren, Fitz-Greene Halleck, J. J. Audubon, Horace Binney, Nicholas Biddle and Bishop White. Many of his portraits are to be found in public buildings in New York, Albany and Philadelphia. He painted also landscape, genre and history. The best known of these are 'The Boyhood of Washington'; 'The News Boy'; 'Rip Van Winkle'; 'Mumble the Peg'; 'Dismal Swamp'; 'Dundrennan Abbey'; 'October Afternoon.' In 1844 he visited England, where he was the guest of Wordsworth, whose portrait he painted, and at whose suggestion he executed his 'Rydal Water,' near the poet's residence. During his residence in England he also painted portraits of Dr. Chalmers, Lord Chancellor Cottenham and Macaulay. Inman was not only one of the most prominent American painters of his time, but a man of great personal magnetism, a keen lover and student of nature, a clever conversationalist and after-dinner speaker, as well as a contributor to and illustrator of the magazines of his days. Consult Van Norden and King, 'Catalogue of Works by the late Henry Inman, etc.' (New York 1846).

INN, a river of Europe which issues from a lake at the foot of the Piz Longhino in the Rhætian Alps, at an altitude of about 8,000 feet, forms a series of small lakes, the best known of which is that of Saint Moritz, then flows

northeast through the deep and narrow valley of the Engadine, in the Swiss canton of the Grisons, enters the Tyrol at Martinsbruck, passes Innsbruck, Hall, and Kufstein, and shortly after enters Bavaria. At Mühldorf it turns east till it receives the Salza, where it begins to form the boundary between Austria and Bavaria, and joins the right bank of the Danube at Passau, after a course of over 300 miles. On account of its rapid current it is of little importance as a navigable river, but it is used extensively to bring timber rafts down to the Danube from the well-wooded mountain regions of its upper section. Consult Greiuz, R., 'Von Innsbruck nach Kufstein Eine Wanderung durch das Unterinntal' (Stuttgart 1902).

INN AND INNKEEPER. In Great Britain inns are houses where travelers are furnished, for the profit of the provider, with food and lodging, and may be set up without license by any person, provided he refrains from selling excisable liquors, which, of course, require a license. Hotels, public-houses, taverns, victualing-houses and coffee-houses are all inns when the keepers of them make it their business to furnish travelers with food and lodging; otherwise they are not. In the United States the equivalents of inns are the road-houses, hotels in cities and saloons in rural districts. See HOTEL; HOTELS IN AMERICA; TAVERNS.

INNATE IDEAS, in epistemology and in metaphysics, are ideas as of right, wrong, freedom, immortality, and of God, supposed by some to inhere in the mind, in which case they are opposed to acquired ideas, and synonymous with inborn or inherited ideas. But innate has also another meaning. Not infrequently it is understood as synonymous with natural, essential, necessary, abstract, pure, a priori, transcendental, or with universal. In the sense of inborn, innate conveys a notion of something temporal. At the outset of this article, it may be admitted, without hesitation, that no inborn ideas exist at all. But likewise, it must be granted that innate ideas, as synonymous with the Kantian a priori, as of God, etc., not only exist, but they have both objective validity and are among the most certain cognitions grasped by the mind of man. For the formal sciences, pure mathematics, logic and pure natural science, are not inborn or inherited, but yet are most certainly a priori, and therefore innate in one (the legitimate second sense) of the word. The term innate as applied to ideas was not, as some say, first employed by the philosopher Descartes. Long before his works appeared, innate, as applied apparently to inborn ideas, was in common use in England, and it is to be found in a poem of Sir John Davis, published four years before Descartes was born. The title of this poem tells us expressly that there are innate ideas in the soul. Then with the taunting question put to Descartes the question of innate ideas enters modern philosophy. The prevailing misapprehension with respect to the doctrine usually ascribed to this philosopher can only be accounted for by supposing that the opinions of Descartes have been more frequently judged from glosses of his nominal followers than from his own works. Among those who seem to have misunderstood Descartes was the lively but superficial philosopher Voltaire. As Descartes not only has been misunderstood by Voltaire, but also by a number of others, it may not be amiss to quote him (as the passage in which his elucidation of his conception occurs is very rare), and let the reader judge for himself.

"When I said that the idea of God is *innate* in us, I never meant more than this, that Nature has endowed us with a faculty by which we may know God; but I have never either said or thought that such ideas had an actual existence, or even that they were species distinct from the faculty of thinking. I will even go further, and assert that nobody has kept at a greater distance than myself from all this trash of scholastic entities, in so much that I could not help smiling when I read of the numerous arguments which Regius has so industriously collected to show that infants have no actual knowledge of God while they remain as yet unborn. Although the idea of God is so imprinted on our minds, that every person has within himself the faculty of knowing God, it does not follow that there may not have been various individuals who have passed through life without making this idea a distinct object of apprehension, and in truth, they who think they have an idea of a plurality of Gods, have no idea of God whatever." ('Cortesii, Epist.,' Pars. I, Epist. xcix). For Voltaire's misrepresentation of this idea of Descartes the reader may turn to Voltaire's "Letter 13," in his 'Letters on the English Nation.' A number of Dutch divines whose opinions differed widely from those of Descartes, found it convenient to shelter their solemn nonsense under his established name. No doubt some of Voltaire's strictures might have found an application there. It is probable too, as Hume says, that no more was meant by those who denied innate ideas than that all ideas were copies of our impressions. Dr. Cudworth, who felt that there are some ideas of the mind not stamped upon it from sensible objects without, and therefore which arise from the innate vigor and activity of the mind, enumerates a rather complete group of such innate ideas. He divides them as follows into two groups: (1) Ideas of wisdom, folly, prudence, imprudence, knowledge, ignorance, verity, falsity, virtue, vice, honesty, dishonesty, justice, injustice, volition, cognition, "nay," he says "of sense itself" as a species of cognition, and which is not perceptible as an idea by any sense. (2) Ideas of cause, effect, means, end, order, proportion, similitude, dissimilitude, equality, inequality, aptitude, inaptitude, symmetry, asymmetry, whole, part, genus, species, and the like.

Perhaps no word in philosophy has been responsible for more confusion than the word idea. In Plato what in logic is called an universal, that is the common nature which thought recognizes in different particular things. Nowadays it sometimes means an opinion, sometimes mental images and sometimes it appears merely as an element in a paraphrasis as in "have an idea of."

Some of the greatest names in European philosophy are associated with the discussion of the question of innate ideas. Besides those already mentioned are Newton, Clark, Malebranche, Lord Shaftesbury, Hobbes, Locke,

Hume, Leibnitz, Cousin and Kant. What the followers of Cousin term universal, necessary and absolute, those of Descartes designate as innate ideas. The difference between the philosophers is more verbal than real. Hobbes, indeed, in his zeal against Descartes, appears to have been not conscious of the fact that his conception of time as the mere "phantasm of before and after notion," along with the reason he gave for so saying, makes him approach more nearly the adherents of inborn ideas than even his opponent Descartes. In this respect the late Herbert Spencer, who seems puzzled by his very natural possession of abstract ideas approaches Hobbes very nearly. At bottom, however, no essential difference between the real sentiments of the more important disputants, as Locke and Descartes existed at all. Modern psychology has set the question at rest. The genesis of ideas is as follows: A sensory experience, with many other impressions like it, is realized in consciousness, and a sentient being has a sensation. Sensations become, in time, percepts. Many percepts of the same kind become concepts or ideas. From concepts abstractions are drawn. And among such abstractions our ideas of freedom, immortality, and even of God, are to be numbered. In other words, "nihil est in intellectu, quod non fuerit in sensu,— there is nought in knowledge, that was not born of the spirit."

INNER LIGHT, The, or INWARD LIGHT. A doctrine especially emphasized by the Quakers. The teaching is that within every soul there is a revelation of God. There is a revelation of God in Nature, there is a revelation of God in the Bible, but there is also the Inner Light revealing God. It may be only a seed and may not come to perfection, for its call may be denied. It differs from the Methodist doctrine of the witness of the Spirit in that it is recognized as always residing in the heart, while the witness of the Spirit comes from without through experience. It differs from the conscience, because its function is not to determine the difference between right and wrong but to illume the soul and make it aware of the presence of God. Consult Barclay, Robert, 'An Apology for the true Christian Divinity'; Bradford, Amory H., 'The Inward Light' (1905).

INNER RHODES, or INNERRHODEN. See APPENZELL.

INNES, ĭn'ĕs, **Alexander Taylor,** Scottish jurist: b. Tain, Ross and Cromarty, Scotland, 18 Dec. 1833; d. Edinburgh, 27 Jan. 1912. He was educated at Edinburgh University, and was admitted to the Scottish bar in 1870. He was an authority on Scottish Church law and wrote 'The Law of Creeds in Scotland' (1867, and brought down to date in 1902); 'Church and State: A Historical Handbook' (1890); 'Studies in Scottish History' (1892); 'The Trial of Jesus Christ' (1899); 'Scottish Churches and the Crisis of 1907.'

INNES, Cosmo, Scottish lawyer and antiquary: b. Durris, 9 Sept. 1798; d. Killin, 31 July 1874. He received his education at the Edinburgh High School and at Glasgow and Oxford universities. In 1822 he passed as a Scottish advocate, became sheriff of Moray in 1840, and subsequently was appointed clerk to the Second Division of the Court of Session. In 1846 he was elected to the chair of history in the University of Edinburgh. He is best known, however, as the author of 'Scotland in the Middle Ages' (1860); 'Sketches of Early Scotch History' (1861) and volume I of 'Acts of the Scottish Parliament.' He published also a volume of lectures on 'Legal Antiquities' (1872), and was the author of several memoirs, including one of Dean Ramsay. Consult the memoir by his daughter, Mrs. Hill Burton (1874).

INNES, Thomas, Scottish historian: b. Drumgask, Aberdeenshire, 1662; d. Paris, 28 Jan. 1744. At 15 he was sent to Paris, where he studied at the College of Navarre and the Scots College, of which latter body his eldest brother was principal after 1682. Thomas received priest's orders in 1692, and after three years of mission work at Inveraven, Banffshire (1698–1701), returned to Paris, and became prefect of studies in the Scots College. To pursue his researches he paid a visit or two to England and Scotland; and Wodrow, who saw him at Edinburgh in 1724, describes him as "a monkish, bookish person, who meddles with nothing but literature." Withal, he was a staunch Jacobite, but no Ultramontane, and is said to have been tainted with Jansenism. He may justly be looked on as the precursor of Niebuhr and Niebuhr's successors; for his 'Critical Essay on the Ancient Inhabitants of Scotland' (2 vols. 1729) is much the earliest of all scientific histories. It was meant for an introduction to a 'Civil and Ecclesiastical History of Scotland,' one volume of which, coming down to Columba's death, he prepared for the press, while another, bringing down the narrative to 831, was left incomplete. Both were edited for the Spalding Club by Grub (Aberdeen 1853). The aim of the whole work was "to counteract the inventions of former historians (Hector Boice), and to go to the bottom of the dark contrivances of factious men (George Buchanan) against the sovereignty of our kings"; and though he thus wrote with a purpose, his honesty and acumen were such that the work retains a permanent value. Consult 'Memoir' by Grub; Chambers' 'Biographical Dictionary of Eminent Scotsmen' (Glasgow 1837); 'Dictionary of National Biography' (Vol. XXIX, London 1892); Forbes. 'An Account of the Familie of Innes' (compiled 1698; first printed, Aberdeen 1864).

INNESS, George, American painter: b. Newburg, N. Y., 1 May 1825; d. Bridge of Allan, Scotland, 3 Aug. 1894. His art education began in boyhood and when 16 years of age he learned map engraving. He first attempted nature sketching in 1843, when he showed such promise that he was admitted into the studio of Regis Gignoux, New York; but soon opened a studio for himself and through the liberality of a patron was enabled to visit Europe. After spending 15 months in Italy and one year (1850) in France he finally made his home at Eagleswood, near Perth Amboy, N. J. He was looked upon as the first among American landscape painters, and was not only a clever and imaginative interpreter of the scenery among which he lived, but a man of intellect, a thoughtful yet bold theorist on art subjects and an incisive critic. He had a keen

appreciation of American scenery, and the sky and atmosphere of the eastern States were sympathetically portrayed with an earnestness that recalls the sentiment of the Fontainebleau-Barbizon school. His early paintings are distinguished by conscientious care for detail, vivid perception of color, and the panoramic breadth of a bold and unconventional originality. After 1878 his style had ripened, and his technique grew simpler and less highly elaborated. He was willing to sacrifice all cleverness of touch in handling detail for the sake of portraying the emotion, or transitory effect of light and cloud in a landscape, the perturbation of storm or wind, the pageant of sunset, or the magic calm of a moonlight scene. In such productions his command of color was very remarkable. His pictures are much prized by connoisseurs, and when offered for sale command high prices. Five of them are in the Metropolitan Museum of Art, New York. Among the finest are 'Under the Greenwood'; 'Close of a Stormy Day'; 'Pine Groves of Barberini Villa'; 'An Autumn Morning'; 'Autumn Gold'; 'The Edge of the Forest'; 'Passing Storm'; 'Moonrise'; 'Winter Morning, Montclair, New Jersey.' Consult Caffin, C. H., 'American Masters of Painting' (New York 1902); Daingerfield, E., 'George Inness, The Man and his art' (New York 1911), and 'Fifty Paintings by George Inness' (New York 1913); Trumble, A., 'George Inness, a Memorial' (New York 1895).

INNESS, George, Jr., American painter; b. Paris, France, 5 Jan. 1854. He is the son of George Inness (q.v.), the landscape painter, whose pupil he was at Rome in 1870–74, and of Bonnat at Paris in 1875. He began to exhibit at the National Academy in 1877, and became a member of the National Academy of Design in 1899. In 1899 he obtained a gold medal at the Paris Salon. His manner is forcible, and skilful in color. His work includes landscapes and animal subjects, among them 'The Pride of the Dairy' (1878); 'Pasture at Chemung'; 'A Mild Day' (1887), and 'Morning on the River' (1902). A great deal of his later work has appeared in the *Century Magazine* with which he has been connected since 1913. He wrote 'The Life, Art and Letters of George Inness' (1917).

INNISFAIL, or Isle of Destiny, the name frequently applied to Ireland by the bards and sometimes also by Anglo-Irish writers.

INNISKILLING. See ENNISKILLEN.

INNOCENT, the name of 13 popes, as follows:

INNOCENT I, Saint: b. Albano; d. 12 March 417. He succeeded Anastasius I as bishop of Rome in 402. He supported Saint Chrysostom (q.v.) when the latter was driven from his see of Constantinople through the machinations of the Empress Eudoxia. Rome was pillaged by Alaric in 410, during his pontificate. He is commemorated by the Roman Catholic Church on 28 July. His correspondence is edited in Migne, 'Patrologia Latina' (Vol. XX).

INNOCENT II (GREGORIO DE' PAPI, or PAPARESCHI): b. Rome; d. 23 Sept. 1143. He was elected Pope in 1130 by a part of the cardinals, while the others elected Peter of Leon, who took the name of Anacletus. Innocent fled to France, where he was acknowledged by the Council of Etampes, by Louis VI, and soon after by Henry II of England; also by the Emperor Lothaire, who conducted him in 1133 to Rome, where he occupied the Lateran, while Anacletus occupied the Castle of Crescentius, the church of Saint Peter, and a large part of the city and maintained himself against Innocent until his death in 1138. He held the second Ecumenical Council in the Lateran, which condemned Arnold of Brescia and his heresy, declared all the decrees of Anacletus null, and excommunicated Roger of Sicily, who had supported the latter. Roger, however, obliged Innocent to acknowledge him as king, absolve him from excommunication, and invest him and his heirs with Apulia, Calabria and Capua. His letters are published in Migne, 'Patrologia Latina' (Vol. CLXXIX, Paris 1844–64).

INNOCENT III (GIOVANNI LOTHARIO CONTI): b. Anagni, Italy, 1161; d. Perugia, Italy, 16 July 1216. On the death of Celestine III (1198) he was unanimously elected at the age of 37. Innocent, in the vigor of manhood, endowed by nature with all the talents of a ruler, possessed of an erudition uncommon at that time, and favored by circumstances, was better qualified than any of his predecessors to elevate the Papal power. By his clemency and prudence he gained over the inhabitants of Rome, obliged the imperial prefect to take the oath of allegiance to him, and directed his attention to every quarter where he believed that a papal claim of property or of feudal rights existed. He concluded treaties with many cities of Tuscany for the mutual protection of their liberties and those of the Church, and soon obtained possession of the ecclesiastical states in their widest extent. He excommunicated Philip Augustus, king of France; laid the kingdom under an interdict in 1200 because Philip had repudiated his wife Ingeburga, and obliged the king to submit. He was still more decided in his treatment of John, king of England, who refused to confirm the election of Stephen Langton as archbishop of Canterbury. Innocent laid the kingdom under an interdict, and in 1212 formally deposed him. John was finally obliged to submit, resigned his territories to Rome, and received them as a papal fief from Innocent. All Christendom acknowledged the Pope's spiritual sovereignty; two Crusades were undertaken at his order, and his influence extended even to Constantinople. Innocent was one of the greatest popes and rulers. It has been said of his rule, as of that of Gregory VII, whom he most resembles, that in those times the power of the Pope was salutary as a bond of union for Europe, in which the still firmer bond of a common civilization and knowledge did not, as at present, exist. In 1215 he held a council, the fourth Lateran and twelfth general which passed the decree making confession and communion obligatory at Paschal time. Frederick II was acknowledged as German emperor, and the Franciscan and Dominican orders were confirmed. His correspondence is in Migne (Vol. CXIV–CXVIII). Consult Von Hurter, 'Geschichte des Papstes Innocenz III und seiner Zeitgenossen' (4 vols., 3d ed., Hamburg 1841–43); Luchaire, 'Innocent III' (Paris 1904–08); Mann, 'Lives of the

Popes in the Early Middle Ages' (London 1914).

INNOCENT IV (SENIBALDI DI FIESCHI): b. Genoa; d. Naples, 7 Dec. 1254. He was Pope from 1243–54 and was perpetually at feud with the German emperor Frederick and his successors. They came to terms in 1244, but these were misinterpreted and Frederick set out to capture Innocent. The Pope fled to Lyons where he called a general council to decide the issue (1245). It was not until after Frederick's death that Innocent was able to return to Rome (1253). Conrad IV, Frederick's successor, continued the strife, for which he was excommunicated in 1254. He died a few weeks later, and his cause was espoused by Manfred, his natural son, who, placing himself at the head of Moorish troops, defeated the Papal army in December of that year. Innocent survived this defeat by five days. He published a commentary on the Decretals of Gregory IX, first printed at Strassburg (1477). Consult Weber, 'Der Kampf Zwischen Papst Innocent IV und Kaiser Frederick II' (Berlin 1900).

INNOCENT V (PIETRO IDI TARENTASIA): b. Savoy, 1225; d. Rome, 22 June 1276. He was of the Dominican Order, taught at Paris, and became Archbishop of Lyons (1271). Shortly afterward he became Cardinal. His pontificate lasted only from 20 January to 22 June of the year 1276. The struggle between the Guelphs and Ghibellines occupied his short reign, as well as efforts to reclaim the Eastern Church for Rome. Innocent V published commentaries on the Bible and on the sentences of Peter Lombard. Consult Gregorovius, F., 'History of the City of Rome in the Middle Ages' (Vol. VI, London 1898); Pastor, L., 'History of the Popes' (Vol. I, London 1906); and Carboni, 'De Innocentio V, Romano Pontifice' (Rome 1894).

INNOCENT VI (ETIENNE D'ALBERT): b. Mons, France; d. 12 Sept. 1362. His pontificate extended from 1352 to 1362, and during this period the Papal residence was at Avignon. He was a man of great learning, and encouraged education and literature. Petrarch lived at his court for a time. Consult bibliography under INNOCENT V, above, and Pastor, L., 'Innocent VI et Blanche de Bourbon, lettres du pape' (ed. by Daumet, Paris 1901).

INNOCENT VII (COSMO DE' MIGLIORATI): b. Sulmona, Abruzzi, Italy, 1366; d. Rome, 6 Nov. 1406. He was Pope from 1404 till his death, but was opposed by the antipope, Benedict XIII, who held his court at Avignon. Consult Gregorovius, F., 'History of the City of Rome in the Middle Ages' (Vol. VI, London 1898).

INNOCENT VIII (GIOVANNI BATTISTA CIBO): b. Genoa, 1432; d. 25 July 1492. He was descended from a noble family of Genoa. Paul II made him Bishop of Savona, and he was appointed cardinal by Sixtus IV. He became Pope in 1484 and was for some time at war with Ferdinand of Naples and held the sultan Bajazet's brother Zelim a prisoner. He showed marked favoritism to the various members of his family. He made his natural son, who had been born to him before he began his ecclesiastical career, ruler of several towns near Rome, and married him to the daughter of Lorenzo de'Medici. For this favor on the part of the Medicis, he made the 14-year-old Giovanni de'Medici a cardinal. Consult Serdonati, 'Vita e fatti d'Innocenzo VIII' (Milan 1829).

INNOCENT IX (GIOVANNI ANTONIO FACCHINETTI): b. Bologna, Italy, 1519; d. 30 Dec. 1591. He studied law, and later was appointed bishop by Pius IV. After the Council of Trent, he became nuncio at Venice, which post he held for six years. Under Gregory XIII, he was cardinal, and was well favored by this pope's successors. He occupied the papal chair only from the 29th of October preceding his death. He published a number of works on philosophy and politics.

INNOCENT X (GIOVANNI BATTISTA PAMFILI): b. Rome, 7 May 1574; d. 6 Jan. 1655. In 1629 he was elevated to the cardinalate and became Pope in 1644. Under him the temporal and spiritual power of the papacy was greatly increased. In 1651 he condemned the Treaty of Westphalia and he formally condemned Jansenism in 1653. Consult Ciampi, 'Innocenzo X Pamfili e la sua corte' (Rome 1878); Hergenröther, 'Katholische Kirche und christlicher Staat' (Freiburg 1872).

INNOCENT XI (BENEDETTO ODESCALCHI): b. Como, Italy, 1611; d. 12 Aug. 1689. He served in his youth as a soldier in Germany and Poland, took orders later and rose through many important posts, became cardinal in 1645, and was elected Pope in 1676, on the death of Clement X. He was eminent for his probity and austerity; zealously opposed nepotism and simony, and restrained luxury and excess. He condemned the New Testament of Mons and several other Jansenistic works. He also anathematized sixty-five propositions drawn from the works of modern Causists and condemned Molinos and the Quietists. He determined to abolish the right of asylum exercised in Rome by foreign ambassadors; but Louis XIV would not yield to so just a claim, occupied Avignon, and imprisoned the papal nuncio in France; in consequence of which the authority of the Pope received a severe blow by the IV Propositiones Cleri Gallicani in 1682. These disputes were highly favorable to the English Revolution, as it induced the Pope in 1689 to unite with the allies against James II, in order to lower the influence of Louis XIV. Consult Gérin, 'Le pape Innocent XI et la révocation de l'Edit de Nantes' (in *Revue des questions historiques*, Paris 1878); id., 'Innocent XI et la révolution anglaise de 1688' (Paris 1876); Immich, 'Papst Innocenz XI' (Berlin 1900); Bryce, 'Holy Roman Empire' (New York 1911).

INNOCENT XII: b. Naples, 13 March 1615; d. 27 Sept. 1700. He became archbishop of Naples, a cardinal in 1681 and Pope in 1692. During his pontificate Louis XIV and the French bishops revoked the declaration of the French clergy, and submitted to the judgment of the Holy See in the matters in dispute during the pontificate of Innocent XI. Consult von Ranke, Leopold, 'History of the Popes' (Vol. II, London 1908).

INNOCENT XIII (MICHELANGELO CONTI): b. Rome, 15 May 1655; d. 7 March 1724. In 1695 he was made archbishop of Tarsus, and became a cardinal in 1707. He was also made

bishop of Viterbo in 1712 and succeeded Clement XI in the papal chair in 1721.

INNOCENTS, Feast of Holy, variously styled Innocent's Day and Childermas, a festival generally observed on the 28th, but in the Eastern Church on 29 December, in commemoration of the massacre of the children at Bethlehem, "from two years old and under," by the order of Herod, with the purpose of destroying among them the infant Saviour. The Church of England at the Reformation retained it in its ritual among its anniversary festivals. Saint Cyprian refers to these children as martyrs, as does Saint Augustine with still greater explicitness. It is to them that the hymn of Prudentius, 'Salvete Flores Martyrum,' is addressed.

INNOCENTS ABROAD, The, a famous book of travels, by Samuel L. Clemens ("Mark Twain"). In a vein of highly original humor this widely-read book records a pleasure excursion to Europe, the Holy Land, and Egypt, in the sixties. Descriptions of real events and the peoples and lands visited are enlivened by more or less fictitious dialogue and adventures.

INNOMINATE ARTERY. See AORTA.

INNOMINATE BONE. See PELVIS.

INNS OF CHANCERY. Originally buildings or building groups in London set aside as residences for the clerks of the chancery courts. They were 10 in number but have long since ceased to exist as public offices, being now merely incorporated societies. See CHANCERY.

INNS OF COURT are certain societies in London exclusively invested with the right to call to the bar in England. The colleges of the English professors and students of common law are called inns, the old English word for the houses of noblemen, bishops and others of extraordinary note being of the same signification as the French *hôtel*. Societies of lawyers, which before the Conquest held their chief abodes for study in ecclesiastical houses, began to be collected into permanent residences soon after the Court of Common Pleas was directed to be held in a fixed place,—a stipulation which occurs in the great charters both of King John and Henry III. In these houses exercises were performed, lectures read and degrees conferred. The Inns of Court are each self-governing and all have equal privileges, and they are officered by benchers—members of standing at the bar—and stewards, and possess the power of disbarring members in case of serious misdemeanor. The inns have extensive ranges of buildings with suites of chambers generally occupied by barristers. Each inn maintains a chapel, the Inner and Middle Temple having the joint use of the Temple Church. The four inns of court are: the Inner Temple and Middle Temple (formerly the dwelling of the Knights Templars, and purchased by some professors of law more than three centuries since); Lincoln's Inn and Gray's Inn (ancienty belonging to the earls of Lincoln and Gray). King's Inn, Dublin, the legal school in the Irish capital, and the Faculty of Advocates in Edinburgh, the Scottish law incorporation, perform analogous functions with the English inns of court in their respective countries.

INNSBRUCK, ins'brook, or **INNSPRUCK** (ancient ŒNIPONTUM; locally called SCHPRUCK), Austrian town and capital of the Tyrol, beautifully situated at an elevation of 1,880 feet, 59 miles south of Munich, on the banks of the Inn, near its confluence with the Sill, and almost in the centre of the valley of the Inn (Innthal), the sides of which are enclosed by mountains several miles distant, but so lofty (7,000 to 8,500 feet) as apparently almost to overhang the town. It consists of the town proper, situated on the right bank of the river, and of five suburbs. It is for the most part well built. The houses are generally of a limestone breccia and from four to five stories high, and built in the Italian style. The buildings most deserving of notice are the Hofkirche, containing the tomb of the Emperor Maximilian I, one of the most splendid monuments of the kind in Europe, though he himself is not interred in it; and the tomb of Hofer; the church of Saint James, with a painting by Lucas Cranach; the Jesuit church, considered the handsomest in the town; the Capuchin church, with good paintings; the new palace, built by Maria Theresa, a very extensive edifice, with gardens which stretch along the side of the Inn and form an excellent promenade; the old palace, in which the archdukes of Tyrol and several of the German emperors used to reside; the university, founded in 1677 and re-established in 1826, well endowed, provided with a great library of 260,000 volumes, botanical garden and cabinet of natural history and attended by about 1,300 students; a gymnasium and several other important educational establishments; and the museum, called Ferdinandeum, rich in all the productions both of art and nature within the limits of the Tyrol. The manufactures include woolen, silk and cotton tissues, gloves, mosaics, glass, etc. As the capital of the Tyrol, Innsbruck is the place of assemblage for its states and the seat of superior appeal, civil and criminal courts and of many important public offices. Many of the spots in the immediate vicinity have become memorable for the noble exploits which the Tyrolese peasantry performed in the War of Independene. Pop. 53,194, and mainly composed of German-speaking Roman Catholics.

INNUENDO, in'ū-ĕn'dō, in law, an interpretation of words held to be injurious; specifically, in an action for libel or slander, an averment by the plaintiff that written or spoken words of the defendant, though apparently not actionable, are in reality defamatory. This clause is used in a declaration to explain the meaning of words only when they are ambiguous in meaning or application. If not justified by preceding averments, it may be rejected as superfluous. See LIBEL; SLANDER.

INNUITS, in'ū-ĭts. See ESKIMOS.

INO, daughter of Cadmus and Harmonia, second wife of Athamas (q.v.), king of Boeotia, who drew upon herself the anger of Hera by nursing Dionysus, the son by Zeus of her sister Semele. In order to favor her own children she projected the murder of her stepchildren, Phrixus and Helle, who saved themselves by flight. Hera, still more highly incensed, made Athamas, the husband of Ino, mad, and he dashed Learchus, his eldest son by Ino, against a rock. Ino fled with her youngest son, Melicertes, and threw herself with him into the sea. Ino and Melicertes were made sea deities at the prayer of Dionysus. Ino was worshiped

under the name of Leucothea. There are a number of variations of this legend. It formed the basis of lost tragedies by Æschylus, Sophocles and Euripides, as well as by other Greek and Roman writers. Consult Gruppe, O., 'Griechische Mythologie und Religionsgeschichte' (2 vols., Munich 1906); Preller, L., 'Griechische Mythologie' (2 vols., 4th ed., 1887).

INOCARPUS, ī-nō-kär'pŭs, a genus of leguminous plants, having unifoliolate leaves and yellow flowers in axillary spikes. *I. edulis* is the South Sea chestnut, native of Tahiti. It is a large tree, with luxuriant foliage, the delicate evergreen leaves being six inches or more in length. It furnishes seeds or nuts much valued in the South Sea Islands, the inhabitants gathering them while green and mashing them for food.

INOCULATION. See INFECTION; VACCINATION.

INOFFICIOUS TESTAMENT, a testament under which no provision is made by the testator for his issue and in which no reason is assigned for the omission. In nearly all jurisdictions such a testament is considered void. See HEIR; SUCCESSION; TESTAMENT.

INOSIT ($C_6H_{12}O_6$), from Greek *is, inos,* a nerve, a muscle), a saccharine substance found in the muscular tissues of the heart, as well as liver, brain, kidneys, etc. It appears both in health and, to an abnormal amount, in disease. It exists also in a number of plants, such as foxglove, potato, kidney-bean, acacia, asparagus, cabbage. See GLUCOSE.

INOUYE, ē'nō-oo'yā', **Kaoru, MARQUIS,** famous Japanese statesman: b. 1835; d. Tokio, 1 Sept. 1915. As a young man he was violently opposed to the intrusion of foreigners at the time when Japan first sanctioned the building of foreign legations in Tokio. Together with his friend Ito, afterward Prince Ito, he set fire to the newly-built British legation as a protest. A secret visit to England in 1864, however, completely changed the ideas of Inouye and Ito. It was forbidden then for Japanese to leave their country, hence visits to foreign lands had to be carried out surreptitiously. The enlarged views which Inouye and Ito took back home brought them into collision with their countrymen and led to a murderous attack on the former. The new ideas spread, however; the great clans of Satsuma, Tosa and Choshu rallied to the cause of national regeneration. Inouye was one of the most prominent leaders in the great reform movement that culminated with extraordinary rapidity in the revolution of 1867 and brought Japan at a bound from a condition of Oriental mediævalism into the front rank of nations. Bows and arrows were still used in the army. In 1870 Inouye became Vice-Minister of Finance in the Okuma administration, his first official appointment. Down to 1898, when he retired from public life, he had held the portfolios of Foreign Affairs, Home Affairs, Finance, Agriculture and Commerce. In every department he displayed resourcefulness, courage and energy, gaining a reputation as a great statesman and a builder of modern Japan. In 1894, after the Japanese had driven the Chinese out of Korea, Inouye was sent to Seoul to reorganize the Korean administration and to superintend the introduction of much-needed reforms. At the outbreak of the Russo-Japanese War Inouye, though in retirement, was commanded by the emperor to attend all important councils and to advise the Minister of Finance. He was created a count in 1884 and marquis in 1907. See JAPAN.

INOWRAZLAU, e'no-vrats'laf, Prussia, town of the province of Posen, 20 miles southwest of Thorn. It contains a gymnasium, Kurhaus and a mediæval church. Its industrial establishments comprise iron works, sugar refineries, flouring mills, brickyards, salt works, etc. It has also a large trade in the agricultural products of the district of which it is the centre. Pop. 26,141.

INQUEST, *in law,* a formal legal inquiry into special matters, as a death, lunacy, an undefended lawsuit or the like; also, the jury making such inquiry. The term had its origin in remote antiquity. It has been in use in England for various purposes for many centuries. It was used not only for official investigation into judicial matters but administrative matters as well.

One of its most important functions, today, both in American and in English law, is to investigate deaths under certain circumstances, as in prison, where violence is suspected, etc. The inquest is usually in charge of an officer known as the coroner, but sometimes it is conducted by a medical inspector, as in some jurisdictions in the United States. The evidence at inquests is taken under oath, after the jury has viewed the body. Often medical experts are called in and a post-mortem examination made of the body. If the verdict of the jury in attendance finds any person guilty of homicide, he is committed to prison to await trial. See CORONER.

Another function of the inquest is to determine whether the government is the lawful owner of lands or goods by forfeiture or lands by escheat. This proceeding is known as "inquest of office" or "office found." In the United States generally this proceeding is held by a commissioner, or similar official, under the direction usually of the Attorney-General. Still another function of the inquest is to determine, under the direction of the sheriff of a county and a jury, the amount of damages due from a defendant to a plaintiff in cases in which the defendant failed to appear or answer and judgment was by default. The procedure is also common in cases of garnishment, replevin and attachment to decide who is entitled to the property in dispute.

INQUILINE, in'kwi-līn, a term applied in zoology to animals which live as tenants within the nests or homes of other animals. The use of the term is almost entirely confined to entomology and then often restricted to the cases in which the rightful and the intruding tenants are closely related. Similar cases among other animals are commonly designated as commensalism (q.v.), but these and similar terms are used rather loosely. Examples of the inquiline relation occur among the termites, ants and bees, but are known especially among the gall-flies (*Cynipidæ*); indeed, one entire division, comprising more than 500 species, is named

Inquilinæ, because of the predominance of this mode of life. These insects differ but little in structure from the true gall-flies, but they lack the power to produce galls and consequently deposit their eggs within those of other species. They infest certain species of galls, as those of the blackberry and some oak-galls, in large numbers and sometimes more than one kind occur in a single gall. Perhaps the most remarkable feature of these inquilines is their frequent close resemblance to the insect which produces the gall which they infest.

INQUISITION, a tribunal or system of tribunals instituted by the Roman Catholic Church for the discovery, examination and conviction of heretics and their punishment by the secular arm. Under the successors of Constantine in the Roman Empire the repression of heresy, or rather the enforcement of the decrees of Church councils and synods, was a function of the imperial government, which inflicted temporal penalties upon the propagators of religious beliefs that contradicted the creeds approved by the state. When the reigning emperor was a favorer of Arianism or any other of the heterodox creeds, the orthodox bishops and their flocks were persecuted; when he was of the orthodox party the heterodox sects were put under the ban. In executing the decrees of the councils the imperial officials, called in the laws of Theodosius and Justinian "inquisitors" (*inquisitores*), were assisted by the bishops; but the tribunals were the ordinary secular courts, and judgment was rendered in the name of the state, not the Church. But in the 12th century, when the supremacy of the ecclesiastical power was universally recognized in western Europe, the initiative in the work of repressing heresy was taken by the Church as of course, and the discovery, trial and conviction of the offenders were functions of the ecclesiastical power solely: the secular power simply executed the judgments of the Church tribunals. Boniface VIII's definition of the respective powers and the mutual relations of Church and state was not proclaimed till the close of the 13th century; but had a similar definition been promulgated in the 12th century it would have expressed the universal sentiment of princes and peoples at the time. The celebrated bull, *Unam Sanctam*, defines that "Both swords, the spiritual and the temporal, are in the power of the Church; yet the one is to be wielded for the Church's behoof, but the other by the Church herself: the one by the hand of the priest, the other by that of the king and the soldier, though at the will and sufferance of the priest *ad nutum et patientiam sacerdotis*. And sword must be subordinate to sword—*oportet gladium esse sub gladio*, and the temporal authority subject to the spiritual power—*temporalem auctoritatem spirituali subjici potestati*."

The first step toward the establishment of courts of inquisition would seem to have been taken in 1179 when the third Council of the Lateran issued a decree of excommunication against the adherents of the heretical sects of southern France, who are charged not only with holding abominable heretical tenets but also with practising "unheard-of cruelties against the Catholics," demolishing the churches and massacring widows and orphans. The Council grants "an indulgence of two years to those who shall make war on them." This decree was re-enforced by the Council of Verona (1184) over which Pope Lucius III presided and at which the Emperor Frederic I assisted; the Council directs the bishops to bring to trial persons accused of heresy and to inflict fit punishment on the guilty. The fourth Council of the Lateran (1215), held in the reign of Innocent III, imposed on the bishops the duty of making a visitation of their dioceses twice or at least once a year either personally or by delegates to see that the Church's laws be enforced. Bishops are authorized to bind the inhabitants of a district by oath to search out heretics and bring them to trial. By the Council of Toulouse (1229) in the pontificate of Gregory IX the search for heretics (*inquisitio hæreticæ pravitatis*) was systematized. The bishops are to name for each parish two or three respectable laymen who shall take oath zealously to search out heretics and to deliver them up to the *baillis*. Whosoever knowingly conceals a heretic loses all his goods. If heretics are discovered on the estate of a landowner, he incurs the penalties: the house of the heretic shall be torn down. Heretics who recant have to seek a new abode and must wear on their clothing two crosses of different colors until the Pope or his legate permits them to assume the ordinary garb. Whoever abstains from use of the sacraments is held suspect of heresy. A person convicted or suspected of heresy is debarred from the practice of medicine. Lest the ordinary Church authorities should be remiss in carrying out this system Gregory IX named (1232) as "pontifical inquisitors" monks or friars from outside, chiefly Dominicans; shortly after the pontifical inquisitors were chosen from the order of the Dominicans exclusively. Thus the duty of inquisition was taken out of the hands of the bishops and was discharged by officials, responsible only to the Pope; from the judgments of the inquisitorial tribunals there was no appeal but only to the Holy See: in 1263 Urban IV appointed an inquisitor-general for Provence, as a means of lowering the flood of appeals to Rome. The institution passed from southern France into the other provinces of that kingdom and into Italy, Germany and Poland. The Inquisition in England was directed by the metropolitans and their suffragans without being responsible to any inquisitor-general; but as long as Lollardism disturbed the peace of the Church the search for heretics was prosecuted rigorously: bishops and archdeacons were required twice a year to make inquisition of suspects: any man might be compelled under penalties to inform against persons suspected of heresy; the statute *de hæretico comburendo* was enacted by the Parliament in 1396.

In Spain the Inquisition, as set up in 1481 by Ferdinand and Isabella, was as much (or more) a political as an ecclesiastical institution: the officials from highest to lowest were appointed by the sovereigns and its action was directed by them without responsibility to the Holy See: Ranke calls the Spanish Inquisition "a royal tribunal furnished with spiritual weapons"; Llorente admits as much. The number of persons put to death under sentence of the Inquisition in Spain is put by Llorente at 31,000 from first to last, that is, during 330 years. But Llorente made it impossible to check his state-

ments by burning the original documents. Ranke impeaches his honesty; Prescott says that his estimates are "most improbable." Catholic historians call attention to the fact that not only heresy but many other offenses against the laws were judged by the courts of inquisition in Spain, viz.: polygamy, seduction, unnatural crimes, smuggling, witchcraft, sorcery, false personation, etc. At the time when the Inquisition flourished, persecution for heresy was a universal practice amongst all Christian peoples, and the methods of punishment inflicted were general throughout Europe. Protestant England persecuted as harshly and vigorously as Catholic Spain, and in both countries denial of the state religion was equivalent to treason.

INQUISITIVE WOMEN ('Le Donne Curiose'), an opera in three acts by Ermanno Wolf-Ferrari (libretto adapted by Luigi Sugana from a Goldoni comedy) first produced in Munich in 1903. The first dramatic work of the composer to secure more than local notice, this opera, or "musical comedy," as he terms it, quickly achieved world-wide success by reason of its vivacity and delicate charm. Of German and Italian parentage, Wolf-Ferrari is an eclectic. The artistic lineage of 'Le Donne Curiose' is plainly traceable to Mozart, though both 'Meistersinger' and 'Falstaff' influences are apparent. The orchestra, effectively used, is relatively a small one and in some respects the treatment harks back to an earlier day, when leading motives were less known. The music is distinguished by lyric simplicity and rythmical variety. The prevailing character is improvisational, well adapted to the slight tale of harmless intrigue which it accompanies. There are several easily recognized numbers — the trios in the first act, the quartet in the second, Rosaura's love soliloquy and the succeeding pages of almost Mozartean simplicity, the prelude to the last act, the barcarolle chorus and the final ensemble. There is no great emotional intensity, nor intellectual depth, but means and end are fitted in a thoroughly artistic and satisfying way.

Lewis M. Isaacs.

INSANE, Institutional Care of the, in the United States.— Previous to the 19th century there was practically speaking no such thing as care of the insane and no hospitals in which to care for them. The mentally ill were either permitted to roam at large, to subsist on begging and other charities, or indifferently confined with paupers in poorhouses or with criminals in prisons, or perhaps more frequently were cared for as best they could be by their people at home. This latter type of care was often not much better than the care that they received in prisons and in poorhouses because their folks were equally ignorant of how to minister to them.

Previous to the beginning of the 19th century there are recorded here and there laws addressed to the problem of the care of the insane. In 1676 a law of Massachusetts delegated the care of the person and the estate of the dependent insane to the selectmen. In 1798 a law was passed in the same State which provided for the commitment to the house of correction of lunatics who were "furiously mad." In 1811 the Massachusetts General Hospital was incorporated and the McLean Hospital established and subsequently opened in 1818. As early as 1650 in Rhode Island we find the Puritan, Roger Williams, making an urgent appeal on behalf of Mrs. Wilson, urging provision for her, whom he describes as a distracted woman. In 1725 a law was passed permitting inland towns to build houses of correction for vagrants and also for "mad persons." In 1742 the care of all the insane and imbeciles was given to the town council with power to appoint guardians for their estates. In 1828 the Dexter Hospital was opened and in 1847 the "Butler Asylum for the Insane." Similar records of legislation are found in a number of the other States, more particularly States along the Atlantic Coast. The earliest action in this country providing for the special care of the insane in specially constructed hospitals was taken by the "Religious Society of Friends" in 1709 and this action resulted in the foundation of the Pennsylvania Hospital in 1751. A portion of this hospital was set apart for the insane and the first patients were admitted in 1752. The first State hospital, however, for the exclusive care of the insane was established in Virginia and is now known as the Eastern State Hospital, at Williamsburg, Va. It was incorporated in 1768 under the name of the "Public Hospital for Persons of Insane and Disordered Minds" and its first patients were admitted in 1773. In 1806 an authorization to a hospital in the city of New York was granted to erect additions and provide suitable apartments for maniacs adapted to the various forms and degrees of insanity. Other important dates in the early part of the 19th century were the opening of an institution for the care of the insane at Frankfort, Pa., by the Society of Friends in 1817, the founding of the Hartford Retreat, in Hartford, Conn., in 1824, the opening of the South Carolina State Hospital for the Insane in 1824, of the Eastern State Hospital at Lexington, Ky., in 1824, of the Western State Hospital at Staunton, Va., in 1828, of one of the buildings of the Blockley Almshouse for the dependent insane in Philadelphia from 1830 to 1834, the Maryland State Hospital for the Insane in 1832, and the New Hampshire State Hospital for the Insane at Concord in 1842.

From this period on the erection of State hospitals went rapidly forward in the different States of the Union. The first law for the creation of a State hospital in New York was passed in 1842. The Utica State Hospital was opened approximately in 1850. The creation of this hospital, as of many others, was largely the work of Dorothea Lynde Dix (1802–87) whose broad philanthrophy extended over many States of the Union and in Europe as far as Constantinople. It was through her efforts that institutions were erected in Massachusetts, Pennsylvania, New Jersey, Rhode Island, North Carolina and the District of Columbia. Some 32 institutions in this country owe their existence, in whole or in part, according to her biographers, to her efforts.

These laws and the founding of these hospitals as above noted show the origin sporadically of those activities which were addressed toward the more humane and intelligent care of the insane. From the beginning of the 19th century on these activities became more numerous and the demands for better care gradually increased. For the most part, however, throughout the

first half of the century and during a considerable period of the latter half, the insane were cared for in a desultory and unintelligent way, largely by local communities, more especially in the various county houses throughout the States. This county house care of the insane placed them on a social par with the paupers, and it not infrequently became a matter of pride to see how cheaply the county could care for these unfortunates. Not only was this true, but the mentally sick patients in the almshouses received practically no medical attention whatever, except as they might be visited occasionally by the physician who was employed to look after the almshouse patients and who almost always was a practitioner in a nearby town and only spent a brief period at intervals at the almshouse or came out on emergencies when requested. He practically never had any experience or any special knowledge of mental illnesses and did little more than look after the physical condition of his patients, generally in a very crude way. The quarters where the mental cases were kept were usually presided over by persons who had no idea of the nature of their problems, were ignorant, often cruel and unsympathetic, so that the lot of these poor people was indeed miserable. They were practically prisoners shut out from all intercourse with their fellows, confined in quarters that were often filthy, dark, unsanitary and unhygienic in every particular, dominated by ignorant and not infrequently cruel caretakers, cheaply fed and clothed, with no medical supervision worthy of the name, and without any effort being made in any direction to bring about an improvement or to effect a cure. The most important move toward the latter part of the century which was made for the better and more humane, more intelligent and scientific care of the mentally ill, was the movement inaugurated in many of the States for State care, namely, provision by the State of public hospitals for the insane, with the consequent removal from the almshouses of this class of patients and transferring them to the State hospitals.

This was the only solution of the neglect and inefficiency of the county care system. The most fundamental defect of the county care system was that the county was too small a political unit to undertake the problem. It had not enough money to properly equip an institution nor did it have a sufficiently broad vision to secure the services of persons competent to handle the problem. All these matters were changed in the State hospitals. The State hospital was well built, well equipped and for the most part well officered, and the improvement in the care of the insane as a result was very great.

In the first period of State hospital care the main effort was to get away from the abuses of the county system and was directed toward humane and philanthropic efforts. The dealing with the mentally deranged patients as though they were sick and trying to effect a cure was as a matter of fact in the minds of the early hospital superintendents, but did not prevent them in many instances from making the mistake of creating enormous asylums for the so-called chronic insane and setting apart single institutions for the care and treatment of the acute cases, thus making out of the asylums places where all hope was lost for those who entered, and overcrowding and overworking the acute reception hospitals beyond their capacity. For many years, for example, the Utica State Hospital at Utica, N. Y., was reserved for the acute cases of the State, while other institutions, as they were built, were reserved for the chronic, incurable class. The next movement was to make out of all of the State institutions hospitals in the real sense of that word, places where the patients would be dealt with as actually ill and an effort made to cure them. The first efforts in this direction were crude, consisting largely in endeavors to treat the patients as patients were treated in general hospitals by keeping them in bed, making observations upon their general physical condition, taking their pulse, temperature, respirations, examining urine, the internal organs, etc., and treating the physical disease which might be found as a result of such examination. This movement did much toward getting better surroundings for the patients, it was contemporaneous with the establishment of training schools for nurses in the State institutions, and its general result was a vast improvement in the quality of care.

Throughout this latter period the hospitals had more or less actively been engaged in a study of the problems of mental disease with a view to discovering their scientific bearings. These researches led to the definite establishment in connection with well-organized State institutions of scientific departments, usually consisting of a laboratory for clinical pathology, and generally also a laboratory for research in pathology. In these laboratories the autopsy material was studied with a view to discovering the correlation between the mental symptoms of the patient and the changes that were found to have occurred in the brain.

Beginning with the latter portion of the 19th century the several States began to appreciate the great extent of the economic problem that was involved in the care and treatment of the insane in their large public hospitals, and there began to be a more or less consistently directed attitude of study of these problems together with a study of methods of administration and control which would look toward higher efficiency and greater economy. The result has been that in most of the States where there are several institutions for the care of the insane that these institutions are controlled by a central body, a lunacy commission or a board of control, usually appointed by the governor. Sometimes these boards of control have still larger powers and include all of the charitable institutions. The details differ in the different States, but central control is the thing aimed at. Along with this central control the scientific departments of the institutions increase in importance and in some instances, as in New York, Massachusetts, Illinois, there are central research departments for all of the hospitals.

The changes in the outlook for the care of the insane largely as a result of all this scientific work have been very great. Interest no longer centres in the autopsy room in attempts to correlate pathological findings and mental symptoms. The interest now is in the living patient and the scientific institutions have elaborated their departments of clinical pathology

for the purpose of studying the processes that are going on in the living patient, while psychological investigations, are becoming much more in vogue with the development of definite interests in psychotherapeutics.

The large housing problem which confronts the several States is still dealt with by the State hospitals, none of which are longer considered, however, as institutions for the chronic insane. All of the hospitals are equipped for taking care of all varieties of illness, mental and physical, acute and chronic. It is recognized, however, that in large centres of population there should be easy access to wards where mental illness could be intelligently handled. The result has been the creation of psychopathic wards or institutions in a number of cities: Albany, N. Y., Boston, Ann Arbor, Mich., Baltimore. These institutions care for the great stream of mental cases which come from large urban populations and which ordinarily would be distributed in other wards of the city hospital. For example, the alcoholic wards of Bellevue hospital are under the immediate charge of the psychiatrist in charge of the psychopathic pavillon. Thus are the problems of general medicine and psychiatry coming to be considered together and their respective specialists are coming to be of mutual assistance.

As mental disease has come to be considered more and more a matter of defective psychological adjustment and methods of psychotherapy have been more and more applied, the hospitals have reached out into the communities which they serve and through the intermediation of dispensaries and social workers have endeavored to extend aid to these communities and also endeavored to assist the discharged patients in rehabilitating themselves in the community. The State hospital, therefore, has come in the past hundred years from a condition in which it was merely a place to confine «mad» persons, to be a centre for education in matters pertaining to mental illness and for the rehabilitation of failures and defects in adjustment for the community in which it is located.

As outlined, the problem of the care of the insane has been gradually evolving as it became progressively larger, first a matter for villages and townships, and for counties, and finally a matter for individual State hospitals, receiving patients from a certain number of counties, then a matter for the State as a whole, governing its several State hospitals by a central board. Beyond that there has never been any recognized statutory central control. The superintendents of all of the institutions for the care of the insane have been organized into a medical society which has now been in existence since 1844, originally known as the Assocation of Medical Superintendents of American Institutions for the Insane. Since 1893 it has been known as the American Medico-Psychological Association. This association has through the years been the clearing-house to which annually was brought all institutional problems and has served most eminently in helping along the work of the care of the insane in several States of the Union. This until recently has been the only agency which in any way correlated the work of the several institutions throughout the country. In 1909, however, there was organized the National Committee for Mental Hygiene under the stimulus and as a result of the unceasing efforts of Mr. Clifford W. Beers. Mr. Beers had himself had a serious attack of mental illness in the course of which he had been a patient in more than one institution. As a result of his experience he felt convinced of the need of an organization which was independent either of political influence or financial or other personal consideration which would help various hospitals to deal with their problems to better advantage. As always happens in large problems the individual elements of which are dispersed over a wide territory, many of the institutions and some of the States remained very backward in their care of the insane. There were no members in their hospitals of the central organization, The American Medico-Psychological Association. As some of the State institutions were as badly off as had been the county asylums, it became the function of the National Committee to endeavor to improve these bad spots throughout the country and in doing so it took an attitude of helpfulness rather than one of criticism and as a result almost always found that defects in methods were due to ignorance, many primitively conducted institutions really believing that they were giving the best posaible service that medical science could suggest. Such institutions were quick to avail themselves of the help of the National Committee and a great deal of improvement throughout the country has resulted from its activities. This has been the work of the National Committee until the beginning of the European War, when it turned its attention practically entirely to war work. The great importance, however, which the conduct of this war of necessity attached to mental problems will result in great benefit to this particular department of medicine.

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INSANE, Statistics of. Statistical data relating to the insane in the United States are found principally in Federal census reports, the reports of State commissions charged with the supervision of the insane, reports of individual State hospitals and special studies. In 1904 and in 1910 the United States Census Bureau issued a special statistical volume relating to the insane and feeble-minded. Prior to 1904 the data concerning the insane were made a part of the general decennial census report. Beginning with 1850 and continuing to 1890 an attempt was made at each decennial census of the population to secure a complete enumeration of the insane by inserting a question relative to insanity in the general population schedule. The results down to 1880 were unsatisfactory as it is generally believed that only a small portion of the people suffering from mental disorders were enumerated as insane. At the tenth census, 1880, the returns of the enumerators were supplemented by special reports from physicians. The latter reported about 17 per cent of the total number of insane enumerated in that year. In taking the census of 1890 no attempt was made to secure supplemental data from physicians. Consequently, the number of insane enumerated in that year did not show an increase commensurate with the growth of the population. In the census of 1900 and of 1910

the question relating to the insane was omitted from the general population schedule. In 1904 a census of the insane in institutions was taken by special enumerators appointed for such purpose. A similar census was taken again in 1910. In 1917 the National Committee for Mental Hygiene made a special census of the insane in institutions, the data being obtained from schedules filled out by hospital superintendents.

These various enumerations of the insane, while in part incomplete, give a general view of the increase in insanity in the United States since 1850. The following tabulation shows the total insane enumerated at each of the several censuses, together with the number of insane per 100,000 of the population:

YEAR OF CENSUS	Total insane enumerated: Number	Total insane enumerated: Per 100,000 population
1917*	234,055	227.6
1910*	187,791	204.2
1904*	150,151	183.6
1890	106,485	170.0
1880	91,959	183.3
1870†	37,432	97.1
1860†	24,042	76.5
1850†	15,610	67.3

* No enumeration of insane outside of institutions.
† Enumeration believed to have been seriously deficient.

The data for the years 1904, 1910 and 1917, which relate to the insane in institutions only, show a remarkable increase of this class of unfortunates as compared with the increase of the general population. The ratio of the insane in institutions to the general population in 1904 was 1 to 545, in 1910, 1 to 490 and in 1917, 1 to 439. It is probable that the actual increase in insanity has not been as great as these figures would indicate. During the last 15 years the practice of placing the insane under institutional care has been greatly extended. As the institutions for the care of the insane have improved they have won a greater degree of public favor, and more mild cases of mental disorder have been admitted thereto. As the incidence of mental disorder increases with advancing age, the lengthening of the average period of human life in recent years has increased the insanity rate by bringing a larger proportion of the population into the advanced age periods. The rate of insanity is found to be much higher in cities than in rural districts. The trend of the population from country to city during the last three decades have therefore been an important factor in causing the upward trend of the rate. After all allowances have been made, however, it is believed by those who have given careful attention to the subject that the insane are increasing more rapidly than the general population, but that the difference in rate of increase is too slight to be alarming.

Insanity in the Several States.— Owing to various factors, such as institutional provision for the insane, distribution of urban and rural population, the composition of the population with respect to age, nativity and race, marked differences in the ratio of the insane to the general population are found in the various States. The following table shows the insane in institutions in the United States by divisions and States in 1910 and 1917, together with the number per 100,000 of general population in each of the two years:

INSANE IN INSTITUTIONS IN THE UNITED STATES BY DIVISIONS AND STATES 1 JAN. 1910 AND 1 JAN. 1917.

DIVISIONS AND STATES	Number: 1 Jan. 1910	Number: 1 Jan. 1917	Rate per 100,000 of general population: 1 Jan. 1910	Rate per 100,000 of general population: 1 Jan. 1917
United States	187,791	234,055	204.2	227.6
New England	19,580	23,542	298.8	326.7
Maine	1,258	1,493	169.5	192.7
New Hampshire	909	1,098	211.1	247.6
Vermont	990	1,110	278.1	304.7
Massachusetts	11,601	14,096	344.6	376.1
Rhode Island	1,243	1,565	229.1	252.4
Connecticut	3,579	4,180	321.1	333.1
Middle Atlantic	52,380	65,145	271.2	296.9
New York	31,280	38,117	343.2	367.7
New Jersey	6,042	7,592	238.1	254.7
Pennsylvania	15,058	19,436	196.4	226.2
East North Central	41,246	49,686	226.0	251.1
Ohio	10,594	12,307	222.2	237.5
Indiana	4,527	5,769	167.6	204.1
Illinois	12,839	16,354	227.7	264.0
Michigan	6,699	7,377	238.4	239.9
Wisconsin	6,587	7,879	282.2	313.4
West North Central	22,683	27,516	194.9	219.8
Minnesota	4,744	5,857	228.5	255.1
Iowa	5,377	6,367	241.7	286.2
Missouri	6,168	7,512	187.3	219.6
North Dakota	628	1,079	108.8	143.4
South Dakota	864	1,059	148.0	149.6
Nebraska	1,990	2,485	166.9	194.5
Kansas	2,912	3,157	172.2	171.5
South Atlantic	19,952	24,758	163.6	185.0
Delaware	441	484	218.0	225.9
Maryland	3,220	4,035	248.6	294.9
District of Columbia	2,890	3,082	872.9	840.6
Virginia	3,635	4,398	176.3	199.7
West Virginia	1,722	2,127	141.0	152.0
North Carolina	2,522	3,446	114.3	142.5
South Carolina	1,541	1,642	101.7	100.5
Georgia	3,132	4,062	120.0	141.2
Florida	849	1,482	112.8	163.8
East South Central	9,759	11,231	116.0	124.9
Kentucky	3,538	4,348	154.5	182.2
Tennessee	2,204	2,518	100.9	109.7
Alabama	2,039	2,341	95.4	99.7
Mississippi	1,978	2,024	110.1	103.0
West South Central	8,413	11,971	95.8	116.1
Arkansas	1,092	1,628	69.4	92.9
Louisiana	2,158	2,552	130.3	138.5
Oklahoma	1,110	2,758	67.0	122.8
Texas	4,053	5,033	104.0	112.5
Mountain	3,574	4,887	135.7	148.8
Montana	697	1,083	185.3	232.3
Idaho	388	540	119.2	123.6
Wyoming	162	226	111.6	120.7
Colorado	1,198	1,613	150.1	165.4
New Mexico	219	302	66.9	72.4
Arizona	337	411	164.9	158.3
Utah	342	474	91.6	108.0
Nevada	230	244	280.9	224.4
Pacific	10,204	15,319	243.4	283.8
Washington	1,987	3,312	174.0	211.5
Oregon	1,565	2,309	232.6	272.0
California	6,652	9,698	279.8	325.0

Insane in Foreign Countries.— Available statistics of the insane in foreign countries are very unsatisfactory. The classifications of mental disorders in the various nationalities are dissimilar and wide variations exist in the provision made for the care of the mentally afflicted. In some cases the insane are enumerated with the feeble-minded and epileptic and the number of the separate classes is not given.

On account of shell shock and the stresses of army life, it is believed that insanity has greatly increased in the belligerent countries of Europe since the beginning of the present war, but the conversion of hospitals for the

insane into military hospitals has reduced the number of civil insane in institutions in these countries. Current statistics of the civil insane in the European countries at war are therefore misleading.

According to the report of the Commissioners in Lunacy, published in 1914, the insane in England and Wales increased from 36,762 in 1859 to 140,237 in 1914, an increase of 281.5 per cent. During the same period the general population of these countries increased 89.5 per cent. The ratio of insane to the general population in England and Wales on 1 Jan. 1914 was 1 to 266, or 376 per 100,000. During the year 1913 there were 18,407 first admissions and 3,896 readmissions to institutions, for the insane in these countries. The rate of first admissions during 1913 was 49.9 per 100,000.

The report of the Inspectors of Lunatics for Ireland for the year ending 31 Dec. 1915 gives the number of insane in institutions in Ireland on 1 Jan. 1915 as 25,180, or a ratio of 575 per 100,000 of estimated population. The number of first admissions in 1914 was 2,798, a ratio of 64 per 100,000 of estimated population. The readmissions numbered 730.

In Scotland, on 1 Jan. 1914, there were 18,682 insane patients in institutions, a ratio of 394 per 100,000. The admissions in 1913 numbered 2,908, a ratio of 61.4 per 100,000 of estimated population.

In Australia, on 1 Jan. 1913, there were 16,439 insane persons under care, a ratio of 347 per 100,000 of estimated population.

In the Netherlands, on 1 Jan. 1914, there were 13,975 insane persons in institutions. The admissions during the preceding year numbered 2,897.

The following table gives a comparison of the increase of insane patients under treatment in various countries from 1890 to 1910, together with the ratio of the insane to the general population in 1910. Owing to the reasons above stated the ratios must be taken with some allowance.

COMPARISON OF INCREASE OF INSANE PATIENTS UNDER TREATMENT IN VARIOUS COUNTRIES, 1890–1910.

(Compiled from official yearbooks and census reports).

COUNTRIES	Insane in institutions			Number per 100,000 of population in 1910
	1 Jan. 1890	1 Jan. 1900	1 Jan. 1910	
United States	74,028	*150,151	187,791	204
England and Wales	86,067	106,611	130,553	262
Scotland	**	15,229	17,792	376
Ireland	16,139	21,014	24,269	553
France	57,418	64,938	74,404	188
Prussia	30,686	52,505	86,007	217
Italy	†24,118	‡86,845	§45,009	130
Belgium	10,515	14,603	18,182	245
Netherlands	6,079	8,139	11,746	200
Norway	1,369	1,707	2,679	112
Sweden	2,555	4,269	6,897	125
Switzerland	4,454	6,648	8,910	238
Australia	**	‡12,427	15,565	285

* 1904. ** Data not available. † 1892. ‡ 1902. § 1908

Switzerland on 1 Jan. 1916 was caring for 9,916 insane patients in its 24 hospitals. The admissions of the preceding year totaled 4,070.

In Sweden, in 1914, the 18 hospitals for the insane housed an average patient population of 9,610. In 1910 the average number housed was 7,866. There were 1,978 admissions in 1910.

In Denmark, on 31 Dec. 1916, the insane in institutions numbered 4,644, a ratio of 168 per 100,000 of the general population.

The insane in public and private institutions in Germany increased from 78,155 in 1891 to 120,872 in 1901. Since 1901, the data in the German yearbooks concerning the insane have included feeble-minded, epileptics, etc.

The total population of the hospitals for the insane in France on 31 Dec. 1912 was 77,237.

Sex of Insane.—The total number of insane enumerated in institutions in the United States on 1 Jan. 1910, included 98,695 males and 89,096 females; the total number of insane admitted during the year 1910 included 34,116 males and 26,653 females. The rates per 100,000 of the general population were: Males, 72.1; females, 59.7; total, 66.1. The ratio of males to females among patients in institutions was 110.8 to 100; and among admissions, 128 to 100. In the general population of the United States in 1910 the ratio of males to females was 106 to 100.

In New York State where the sexes are nearly equally distributed in the general population, on 30 June 1917, there were 18,422 males and 20,342 females in institutions for the insane, a ratio of 90.6 males to 100 females. Among the first admissions to all institutions for the insane in the State in 1917, there were 3,878 males and 3,462 females, a ratio of 112 males to 100 females.

The excess of males among first admissions is largely due to the greater prevalence of general paralysis and alcoholic insanity in this sex. As patients with general paralysis have a high rate of mortality and patients with alcoholic insanity improve rapidly, the average duration of hospital life is less for males than for females. In the New York civil State hospitals in 1917 the average duration of the hospital life of the male patients who died in the hospitals was 5.5 years, and of the female, 7.2 years.

Age of the Insane.—Mental diseases occur principally during the period of adult life, the rate of incidence increasing with advancing age. The age distribution of the 6,877 first admissions to the New York civil State hospitals in 1917 as compared with the age distribution of the general population of the State in 1910 is given in the following table:

COMPARISON OF AGE DISTRIBUTION OF FIRST ADMISSIONS, 1917, AND OF THE GENERAL POPULATION OF THE STATE, 1910.

AGE	First admissions 1917	Per cent of total first admissions 1917	Per cent of general population of New York 1910
Under 15 years	12	0.2	27.3
15 to 19 years	317	4.6	9.2
20 to 24 years	721	10.5	10.3
25 to 29 years	833	12.1	9.7
30 to 34 years	835	12.1	8.4
35 to 39 years	797	11.6	7.8
40 to 44 years	639	9.3	6.6
45 to 49 years	604	8.8	5.5
50 to 54 years	518	7.5	4.6
55 to 59 years	405	5.9	3.2
60 to 64 years	342	5.0	2.6
65 to 74 years	490	7.1	3.2
75 years and over	332	4.8	1.4
Unascertained	32	0.5	0.1
Total	6,877	100.0	100.0

Causes of Insanity.— Causes of mental diseases are multiple rather than single. Several factors may operate together to cause the onset of a psychosis. Alcohol has always been a prominent factor in the causation of mental disease but its influence seems to have declined in recent years. Syphilis is the primary cause in all cases of general paralysis and of psychoses with cerebral syphilis. Opium and its derivatives, cocaine and other habit-forming drugs cause psychoses in comparatively few cases. Arteriosclerosis by shutting off the blood supply to important parts of the brain prevents this organ from performing its natural functions and thus causes various forms of mental disorder. Blows on the head cause insanity in a similar way by injuring brain tissues. Fevers and exhausting physical diseases often give rise to mental disease.

Insanity may also be due to mental causes, such as fear, joy, anger, grief or anxiety.

Abnormal mental make-up in either the temperamental or intellectual sphere is a predisposing cause in many cases. The abnormal mind gives way to unusual stress while the normal mind is able to withstand it. When the stress is prolonged or of extraordinary severity, as in army life, even the normal mind may give way.

The following table shows the relative prominence of the principal definite causes among males and females as reported by the New York State hospitals.

CAUSES OF MENTAL DISEASE AMONG FIRST ADMISSIONS TO THE CIVIL NEW YORK STATE HOSPITALS FOR THE INSANE, FOR THE YEAR ENDING 30 JUNE 1917.

CAUSES	Number of Cases			Per cent		
	Males	Females	Total	Males	Females	Total
Alcohol	655	209	864	18.2	6.4	12.6
Syphilis	750	212	962	20.8	6.5	14.0
Drugs	5	12	17	0.1	0.4	0.2
Abnormal make-up	1,047	1,037	2,084	29.0	31.7	30.3
Injury to head	30	6	36	0.8	0.2	0.5
Physical illness	55	73	128	1.5	2.2	1.9
Senility	247	371	618	6.9	11.3	9.0
Arteriosclerosis	462	334	796	12.8	10.2	11.6
Epilepsy	78	73	151	2.2	2.2	2.2
Pregnancy, childbirth and lactation	.....	122	122	.....	3.7	1.8
Death in family	25	123	148	0.7	3.8	2.2
Loss of employment and financial loss	71	46	117	2.0	1.4	1.7
Disappointment in love	18	24	42	0.5	0.7	0.6
Other specified causes	212	523	735	5.9	16.0	10.7
Unascertained	696	821	1,517	19.3	25.1	22.1
Total first admissions	3,605	3,272	*6,877	.....	.....	.....

* As each cause reported was enumerated, the number of causes exceeds the number of patients.

Insane Classified with Reference to Psychoses.— No nation-wide census of the insane in the United States with reference to psychoses of mental diseases has ever been taken. The accompanying table gives the result of a census of the 36,357 patients in the New York State hospitals taken by psychoses on 1 July 1917. As the patients of the New York State hospitals have been carefully classified with reference to psychoses for the past 10 years this census may be considered representative of the distribution of insane patients in institutions in the various clinical groups. As the duration of hospital life of patients in some groups is much longer than in others the distribution of the patients in the hospitals with respect to psychoses varies considerably from that of the newly-admitted cases. This is shown clearly in the accompanying table.

DISTRIBUTION BY PSYCHOSES OF INSANE PATIENTS IN CIVIL STATE HOSPITALS IN NEW YORK STATE AND OF FIRST ADMISSIONS TO SUCH HOSPITALS IN 1917.

PSYCHOSES	Patients in civil State hospitals, 30 June 1917		First admissions year ending 30 June 1917	
	Number	Per cent	Number	Per cent
Traumatic	53	0.15	18	0.3
Senile	1,238	3.41	585	8.5
With cerebral arteriosclerosis	469	1.29	395	5.5
Dementia paralytica	1,370	3.77	866	12.6
With cerebral syphilis	122	0.34	43	0.6
With Huntington's chorea	24	0.06	10	0.1
With brain tumor	14	0.04	8	0.1
With other brain or nervous diseases	127	0.35	38	0.5
Alcoholic	1,788	4.92	594	8.6
Drug and other toxic	29	0.08	15	0.2
Infective-exhaustive	52	0.14	99	1.5
Allied to infective-exhaustive	27	0.07	20	0.3
Autotoxic	15	0.04	19	0.3
Manic-depressive	2,716	7.47	833	12.1
Allied to manic-depressive	1,116	3.07	303	4.4
Involution melancholia	785	2.16	201	3.0
Symptomatic depressions	25	0.07	17	0.3
Dementia precox	19,544	53.76	1,475	21.5
Allied to dementia precox	1,273	3.50	311	4.5
Paranoic conditions and paranoias	1,634	4.49	135	2.0
Epileptic	1,223	3.36	142	2.1
Psychoneuroses	162	0.45	77	1.1
Constitutional inferiority	503	1.38	108	1.6
Mental deficiency	1,319	3.63	179	2.7
Unclassified	705	1.94	297	4.3
Not insane	24	0.06	89	1.3
Total	36,357	100.00	6,877	100.0

Movement for Uniform Statistics of the Insane.— As previously pointed out, statistics of the insane until recent years dealt principally with the number enumerated in various States and countries without regard to the kinds of mental disease with which they were afflicted. In fact, the absence of a generally accepted classification prior to 1917 prevented the collection of national statistics of mental diseases. The first bureau of statistics for the study of mental diseases was established in 1908 by the New York State Commission in Lunacy (now the State Hospital Commission). The Commission adopted a uniform classification of mental diseases for use in its 13 State hospitals, and required the medical officers of each hospital to submit to the Commission's statistician a statistical card report concerning each case admitted, readmitted, discharged or deceased. From such cards yearly statistical reports have been prepared and published, and

the cards have been filed according to identification number and psychosis. The Commission now (1918) has a file of uniform cards of about 60,000 first admissions — the largest collection of systematic data concerning mental diseases in the world. By combining the cards received from all the hospitals for a series of years, the bureau is able to make intensive studies of the separate mental diseases.

The success of New York's pioneer work led the American Medico-Psychological Association to undertake a movement for uniform statistics of the insane throughout the United States. At the meeting of the Association held in Niagara Falls in June 1913, a special committee was appointed to devise ways and means of securing uniform statistical reports from institutions for the insane. This committee, after prolonged conferences, submitted its final report to the Association at the annual meeting held in New York in May 1917. The report recommended the adoption of a new classification of mental diseases and submitted outlines of 18 statistical tables for use in the annual reports of institutions for the insane. The committee stated that "the lack of uniformity in hospital reports at the present time makes it absolutely impossible to collect comparative statistics concerning mental diseases in different states and countries, and extremely difficult to secure comparative data relative to the movement of patients, administration and cost of maintenance and additions"; and that the "importance and need of such uniform data have been repeatedly emphasized by officers of the association, by statisticians of the United States Census Bureau, by editors of psychiatric journals and by administrative officers in various states." "Such data," the committee adds, "should serve as the basis for constructive work in raising the standard of care of the insane, as a guide for preventive effort, and as an aid in the progress of psychiatry." The report of the committee was unanimously adopted and a standing committee on statistics was appointed to secure the adoption of the new classification and statistical system by Federal and State authorities. In February 1918, such standing committee affiliated with the National Committee for Mental Hygiene which had received a special gift for statistical work.

Through the co-operative work of the two organizations a uniform system of statistics of mental diseases was put into operation in nearly all the State hospitals for the insane in the United States during the summer of 1918. The surgeon-general of the army, in September 1917, adopted practically the same system for use in the Division of Neurology and Psychiatry.

The Association's classification of mental diseases which forms the basis of the new statistical system consists of 22 groups of principal psychoses, some of which are subdivided into more or less distinct types. The classification is not regarded as final, but it constitutes the first successful attempt to secure uniformity in the designation of mental diseases in the United States.

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HORATIO M. POLLOCK.

INSANE ASYLUMS, Cottage System or Village Plan. A form of construction for insane asylums and charitable institutions, in which large buildings are replaced by detached cottages. The cottages vary in size from those which will accommodate six to a dozen patients to larger ones which will accommodate 20 or more. They are usually constructed either in groups or along streets and avenues as a village. In the former, the several groups are given up to a particular industry as a farm group, where the patients are employed at farming, and others, as the garden, the brick yard, shop industries, etc., all of these being a part of one institution on a single large estate. In the village plan the institution is laid off in streets and avenues, and has the appearance of an ordinary village, each cottage having a flower garden in front, shade trees, etc. In either plan, there is conveniently located near the centre of the plant an administration building, a hospital for the sick and those requiring special care, a bakery, a laundry and other utility buildings. The cottages may be constructed of wood or other material, and the cost of construction is small as compared with the old plan of asylum construction. It is, besides, more homelike, more convenient for administration and permits of indefinite expansion. Some of the best-known institutions constructed on this plan are Alt-Scherbitz near Leipzig; Gabersee near Munich, Germany; the Saint Lawrence State Hospital at Ogdensburg, N. Y., and the Craig Colony for Epileptics at Sonyea, N. Y.

INSANITY. This is a purely legal term. Its use as a medical term should cease as it leads to interminable confusion and defeats the ends of justice. The confusion is very old however and will take time to eradicate. Insanity then simply represents certain legal situations which by reason of one or another disease, chiefly involving the brain, render the individual responsible or not responsible for a criminal act, an act of contract making or of making a will. If, according to the evidence adduced before a properly constituted legal tribunal, it is decided that the individual's acts in question were not responsible, or he did not have contract capacity, or he did not possess testamentary capacity, because of some disease, injury or defect of the brain, then the individual in question has thrust upon him a legal status — insane. It is necessary to insist upon the purely legal character of the situation — because the tests for responsibility for contract capacity, for testamentary capacity vary with every jurisdiction. Thus a man may be insane in New York and sane in New Jersey, or vice-versa. He only has to step over the line. Certainly this is not a medical concept of a disease. No disease can change by crossing a territorial line. Thus it must come about that the word insane — insanity, etc., must be con-

fined purely to its legal usage — or better abolished entirely.

The confusion arose in the days of the Roman law, and law is such a conservative instrument it is hard to eradicate old conceptions. In Roman days all brain diseases were lumped into one. The Romans despised Greek subtleties, they said, just as most stupid people despise their superiors in intelligence. The Greeks had separated various brain diseases and gave them different names. They were really a scientific people. But the Romans had a passion for organization. They lumped all of these very diverse diseases and called them "*Insania.*" To them insania was *a* brain disease. What are really different brain diseases, they called "forms of insanity." This is a false and nonsensical concept and leads to much mischief in our present law court practice. Thus in New York State the legal test for responsibility is whether the individual knows the nature and quality of an act and knows whether it is wrong. There are a number of very severe and chronic mental illnesses which totally destroy an individual's responsibility, but such individuals may still retain this purely intellectual test. New York State would electrocute such seriously sick individuals and commit an act of gross injustice. In New Jersey — another feature is added to this test — namely, the capacity to resist an impulse, and in other States other tests. The whole test business is largely a farce, and is founded on the totally erroneous idea in the minds of law givers that there is such a disease as "insanity" and that it has different "forms." There is no such thing as a disease "insanity" — and there are no forms of it, just as there is no disease called "cough." One may cough from dust, from gas, from tuberculosis, from bronchitis, from cancer of the larynx, to warn a friend or to hide a confusion. Certainly dust, gas, tuberculosis, bronchitis, cancer, warning and hiding are not *a* disease. So an individual may have a brain tumor, he may have a meningitis, a syphilis of the brain, tuberculosis of the brain, thyroid poisoning, a paranoia, a dementia precox or any of a hundred different and dissimilar diseases, and as a result of such a disease he may commit an antisocial act, which if resulting from the disease caused him not to know the nature and the quality of the act, not know it was wrong, or knowing these things even, may have believed himself commanded by God to do the deed, then, varying with the State's legal definition, he becomes legally insane. He acquires a purely legal status. He has not got any insanity. There is no such disease. He may have one of the diseases just enumerated, which causes him to acquire a legal status. See PSYCHIATRY; MENTAL DISEASES.

INSANITY, in the legal sense, such a degree of mental unsoundness as to call for the restraint of the person afflicted or to justify the authorities in depriving him of the management of his property and affairs. An insane person comes in contact with the law (1) when he suffers from such unsoundness of mind that it is necessary for his own or the public welfare that his liberty be restricted; (2) when he is incapable of managing himself or his affairs, or of directing their management; and (3) when a plea of insanity is entered on his behalf in answer to a criminal charge. Insanity in a legal sense includes only questions of life or property, competency and responsibility, and ability to transact the affairs of life. According to the law of the United States, the modern view is that whether a person is or is not insane is in every case a question of fact. The courts are quite liberal in attempting to sustain wills of persons who are not wholly insane. If a person has sufficient understanding to comprehend the nature of the testamentary act, knows the nature of his property and shows clearly that he could decide why he wanted his property to go to the beneficiaries named, his will is usually received and probated. An insane person is responsible for his torts. He is criminally responsible for his actions, unless from defective mental power or from mental disease he cannot understand the nature of his acts, or does not know that his act is wrong, or is unable to control his conduct — unless, in the last case, his want of control arises from his own fault. An insane person must sue or defend an action through his guardian *ad litem*. A person confined against his will as insane is entitled to a writ of *habeas corpus* and a judicial inquiry as to the legality of his detention.

INSCRIPTIONS. The term inscriptions comprises, in its widest sense, all words or word-signs engraved (or painted) on relatively durable materials such as natural cliffs, wrought stone, baked clay, metal or even wood. For reasons of practical convenience, however, certain sorts of inscriptions are grouped apart; for example, legends on coins and the lettering on painted vases. The etymological sense of inscription (Latin *inscriptio*, "in-scratching") is not to be taken so strictly as to exclude raised lettering. The rôle of inscriptions in modern times accords in general with the ancient use, but is much less extended. Then, copies of official and religious documents were frequently promulgated in the form of inscriptions, a usage that no longer survives, though commemorative and titular inscriptions are still plentifully employed. In general, inscriptions serve one of two purposes: (1) they constitute a record, and the material containing them is wrought for the express purpose of receiving the inscription (example, known from literature only, Moses' stones tables that held the decalogue); (2) the object on which the inscription is engraved fulfils a purpose of its own, while the lettering indicates the name, nature, purpose, maker or owner of the material object (commemorative column, mirror, ring, etc.). To these may be added another class, (3) the incidental inscription, a notice or entry upon an object not prepared to receive it.

Inscriptions furnish materials of value to students in many fields. To the historian — and we must understand history to be the life-record of the nation and its citizens — they supply evidence of great value, all the more valuable because nearly always contemporaneous with the facts recorded. The incidental as well as the formal record may bear testimony. An example of this sort has been found on the leg of a colossal statue at Abusimbel in Nubia, whereon Greek mercenaries who had ascended the Nile under the leadership of Psammetichus — more probably the second (594–589 B.C.) than the first (654–617) of that name — traced a brief notice of their expedition. The

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incidental inscription is particularly apt to furnish details valuable for social history. To the archæologist inscriptions of the second class furnish testimony of value for topography (witness the fragments of the marble *Forma Urbis*, an ancient inscribed plan of the chief buildings of Rome) and for the precise identification of statues and other works of art. The discovery of inscriptions is among the express tasks of the excavating archæologist, who thus supplies the raw material, so to speak, for the historian or philologian. To the philologian inscriptions yield the key to the history of writing and, if his interests lie in the comparative and historical study of words, give him a fuller knowledge of their form. To the philologian of literary interests, inscriptions yield a knowledge of historical fact or of vocabulary that may lead to a correct interpretation of a difficult literary passage. For example, the Greek historian, Thucydides, records (6.54) an altar inscription set up by Peisistratus (527–510 B.C.), which, he says, was still "in clear evidence," but "in dim letters." The identical inscription was found in 1877, with lettering perfectly distinct, and the literary interpretation of "dim" had to be revised and brought into accord with the facts. Meantime, the archæologists had learned that red or blue paint was employed to bring out more clearly the lettering of Greek inscriptions, and it was easy to infer that not the incision but the coloring of this inscription was dim in the time of Thucydides. Inscriptions previously known from literary works have for the philologian the added value of yielding testimony concerning the reliability of the manuscript tradition. Thus the best manuscript of Thucydides is of the 10th century A.D. and, as the last in a long chain of copies, must have been exposed to a great deal of corruption in transmission. The fact that a treaty recorded by the historian (5.47) corresponds almost exactly with the (fragmentary) inscription recording the alliance is reassuring for the MS. tradition. The *littérateur*, even, may be concerned with material furnished by inscriptions. One of the most considerable fragments of the poet Simonides, for example, has reached us in a copy on stone of an epitaph (epigram) in honor of the Megarians who fell in the Persian War. Some literatures have survived only as inscriptions.

It is safe to declare that inscriptions are as widely diffused as the art of writing. Even a primitive picture, if painted to convey a message, would constitute an inscription. Hieroglyphics (conventionalized picture writing) constitute the most primitive type of writing, and inscriptions of this sort, in the Maya language, are found in Yucatan. Though probably not earlier than the discovery of America, these represent, as regards writing, the same stage of culture as the hieroglyphics of Egypt (4700 B.C.). Chinese inscriptions — the Chinese being a highly conventionalized hieroglyphic script — of 1200 B.C. are also extant. The Mayan (and Aztec) system is still very imperfectly understood. Egyptian hieroglyphics were likewise long undeciphered, but in 1822 the Rosetta Stone (q.v.), a trilingual in Greek, demotic Egyptian, and hieroglyphics whereon the names Ptolemy and Cleopatra were of frequent occurrence, furnished a clue to the hieroglyphics which had been conventionalized, through a syllabary, to a pure phonetic system. — — This means, to invent an instance, that a picture (symbol) representing motion [= (to) go] comes to be used for the syllable *go* in a proper name like Goshen (this step was taken by Aztec hieroglyphics), or in a word like gopher: and that in the last stage the syllable sign *go* reduces to the letter *g*. — — The decipherment and interpretation of Egyptian inscription belongs to the science called Egyptology. See EGYPT.

The cuneiform script, invented by the Accadians of Chaldæa, found its way to the Semites of Babylonia and Assyria. This was a syllabary, developed from an earlier pictorial system, and such it remained in those countries, where not only small objects like seals and cylinders, but whole libraries of clay tablets (reaching back into the 4th millennium B.C.), have been found. These tablets contain genuine literary works as well as the documents and announcements commonly included under the term inscriptions. The University of Pennsylvania is in possession of some 35,000 cuneiform documents, a collection particularly rich in fourth and second millennium records, and outnumbered only by the British Museum and the Louvre collections. The Tell-el-Amarna Letters are historically among the most noteworthy cuneiform inscriptions. Found by an Egyptian peasant woman in 1887, the collection is now split up between the Berlin and British museums, though a part remains in Egypt. These tablets contain a correspondence between three kings of Egypt (15th century B.C.) and the rulers of Babylonia, Assyria, Armenia, the states of Asia Minor, Syria and Palestine. Of transcendent importance for the early political history of western Asia, this correspondence is also accounted to confirm the validity of the Hebrew Scriptures as an historical record. It is noteworthy for the history of culture that the petty chief of every town could command the services of a scribe able to write a letter in Assyrian — the common correspondence language, it would seem, of all those countries. The science of Semitic Cuneiform belongs to Assyriology (q.v.).

Fortunately the Assyrian syllabary, after being borrowed by the Medic Aryans, was converted into an alphabetic system. King Darius (521 B.C.) caused an Old Persian (Protomedic) inscription of 413 lines, averaging 6 feet each, with versions in Neo-babylonian and Neo-elamitic, to be inscribed on the Great Rock of Behistun, at a height of 400–500 feet. The same script had been observed on another short inscription found at Persepolis, which evidently contained proper names chiefly. As early as 1802 Grotefend allocated the names Darius, Xerxes and Hystaspes to certain script groups in these brief formulæ, and correctly isolated nine of the 13 symbols concerned. In course of time the entire Protomedic cuneiform alphabet was identified and subsequently the more complex Semitic syllabaries were worked out, resulting in the decipherment of the older cuneiform. In the Behistun inscription Darius, following precedents of Assyrian kings, summed up the history of his accession and

reign. Copied in 1844 by Mr. H. C. Rawlinson, it has been carefully inspected again (1903) by the American scholar, Mr. A. V. W. Jackson.

Farther west, the Phœnicians, also Semitic, developed, perhaps from Egyptian hieroglyphics, a true alphabet, out of which sprang, on the one hand, the scripts used by the Hebrews, Arabs, Persians and Hindus, and on the other the Greek (and Roman) type. The most notable early inscription in alphabetic Semitic is the Moabite Stone (q.v.) (9th century B.C.), which recounts the victory of Mesha, king of Moab, over Israel. The language used differs but slightly from that of the Hebrew Scriptures, of the historical validity of which the Moabite Stone, like the Tell-el-Amarna Letters, is held to be in general confirmatory. [For facsimile, transcript and translation consult Hastings' 'Dictionary of the Bible' (III, p. 405 seq.)]. Phœnician-Greek bilinguals from Cyprus, belonging to the 4th century B.C., are extant; also Phœnician-Cypriote, which furnished the key to the Cypriote syllabary. Punic inscriptions proper are chiefly of the dedicatory sort, and relatively late, all after the Greek period. Aramaic dockets on Assyrian contract tablets (8th century B.C.) form another instance of early alphabetic Semitic.

India also has its inscriptions. The oldest (250 B.C.) and most interesting are the religious edicts of King Piyadassi, known as the Asoka Edicts, which are engraved on rocks and pillars. They inculcate the religion and morals adopted by this king after his conversion to Buddhism. These inscriptions, in two unknown alphabets (Karosthī and Brahmī), were deciphered chiefly by James Prinsep, who, in the winter of 1837–38, single-handed, unraveled the Brahmī script. He guessed that in certain brief Brahmī inscriptions, plainly of a votive character, a frequently recurring final group of letters must stand for the notion "gift" and be equivalent, if the language was Sanskritic, to *dānam*. He further surmised that the consonant preceding *dānam* must be the genitive (possessive) sign — *s*. He thus isolated the three consonants *s, d, n,* and, with this start, soon identified the entire alphabet.

Greek and Roman inscriptions have been more studied and are accordingly more systematized for study than any others. The ancient Greeks were themselves conscious of the importance of inscriptions. Herodotus used them as sources, and Thucydides and Xenophon quoted them. Decrees are sparingly mentioned by Isocrates, but freely quoted by Demosthenes, who probably made use of the papyrus originals from the department of archives, not all decrees being promulgated on stone. Euripides alludes to the custom of inscribing formal compacts on tripods and dedicating them in temples. Greek antiquaries and scholars even made collections of inscriptions and Polemon (300 B.C.), who was neither the first nor the last of these collectors, owing to his zeal as an inscription hunter, got the nickname of *stēlokopas,* "tablet-picker." Roman writers also — Cicero, Livy, Pliny the Elder, Suetonius — occasionally mentioned inscriptions of historical interest. Varro, the antiquary, and the lexicographer, Verrius Flaccus, commented on the diction of inscriptions; while Polybius, the Greek historian of Rome, actually cited inscriptions, making a fuller use of them than Livy. But no interest in collecting inscriptions, comparable to the Greek interest, ever developed among the Romans. From the Revival of Learning on, scholars were not lacking to show an interest in classical inscriptions, but the modern impulse may be said to have had its point of departure in the first quarter of the 19th century when the Prussian Academy, under the promptings of August Boeckh, inaugurated the great collection known as the 'Corpus Inscriptionum Græcarum' (4 vols., 1825–56), which contained nearly 10,000 numbers. But fresh inscriptions are ever coming to light — *dies diem docet* — and in 1891 the number was estimated at 50,000. There has been a steady increase ever since. Excavations are now pursued in Greece and Grecian countries with a diligence and at an outlay never before known. Almost all the great nations have established archæological institutes in Athens, and all of these issue some form of learned journal devoted in part to the publication of the new inscriptions discovered; for example, 'Papers of the American School of Classical Studies at Athens,' *American Journal of Archæology, Bulletin de Correspondence Hellenique, Ephemeris Archaiologikè, Journal of Hellenic Studies, Mittheilungen des deutschen Archæologischen Institut, Archæologisch-Epigraphische Mittheilungen aus Oesterreich,* etc. Further great collections like Boeckh's have been issued, for example, the 'Corpus Inscriptionum Atticarum' and the 'Sammlung Dialekt-Inschriften' (in progress). A similar activity has been exhibited at Rome also, with the same establishment of archæological institutes. In 1863 the first volume of the 'Corpus Inscriptionun Latinarium,' also supported by the Prussian Academy, was issued. Since then 15 volumes, with numerous supplements, have been published, new inscriptions being first provisionally printed in the 'Ephemeris Epigraphica.' In all, some 150,000 Latin inscriptions are now accessible in print.

Classical inscriptions require two classes of investigator, the field collector and the closet student. A knowledge of Greek and Latin acquired from printed books does not equip the student for field collecting. It is true that the decipherment of the known script of classical inscriptions does not present problems like those solved by the ingenuity of Grotefend and Prinsep but, for all that, training is needed for the accurate reading and copying of the inscription. Absolute accuracy in copying is difficult of attainment, but a "squeeze" made of (unsized) paper, wetted and packed into every crevice, or a copy made by covering the inscription with a sheet of dry paper and rubbing the same with powdered graphite secure excellent results. America has produced one collector of large and successful experience, Mr. J. R. Sitlington Sterrett, whose collections are to be found chiefly in the 'Papers of the American School.' After correct copies have been secured it remains intelligently to divine words and letters lost by mutilation and to expand the abbreviations, but the latter have been so thoroughly listed in works on epigraphy (= the science of inscriptions) as now to present little difficulty. The same works have so classified the script-forms as greatly to simplify the act of reading the inscription, and their topical

arrangement of the subject matter of inscriptions is a great aid to interpretation.

Greek official inscriptions were chiefly recorded on marble, Roman on bronze. The latter material, being available for so many uses, proved the less enduring. But marble slabs were also converted into building material or foundation stones of ramparts, and at Rome many an inscribed stone was calcined into lime. So many were the hazards to which inscriptions were exposed that it is exceptional to find an important one in its original location. For purposes of study the modern habit of gathering inscriptions into museums is highly convenient. In Greece, besides public squares and buildings, temples were a favorite repository for inscriptions, such as state treaties, tribute and treasure lists; dress, armor, weapons and other offerings of gratitude — all with dedicatory inscriptions — made the temple a sort of museum; images of afflicted parts of the body that had been cured, with accounts of the case inscribed thereon, were offered to gods of healing, forming a sort of nucleus of an anatomical collection and a medical library. Commonest of all forms was the sepulchral inscription which began with simple announcements but grew into sounding eulogies. Among the Greek inscriptions none has been found so comprehensively important for history as the Great Rock of Behistum, but Mr. C. T. Newton, in his essays 'On Greek Inscriptions' [*Contemporary Review* (December 1876); *Nineteenth Century* (June and August 1878, reprinted in 'Essays on Art and Archæology,' p. 95, et seq.)], has set forth with great charm their collective value for history and the things pertaining to religion. At Rome, Augustus caused a succinct account of his deeds to be engraved in bronze and set up before his mausoleum. This inscription, widely diffused in the Augustus temples throughout the empire, was discovered at Ancyra (now Angora). The Monumentum Ancyranum constitutes an extensive historical document of the very first importance. The Edict of Diocletian (303 A.D.) has quite a modern ring, being a law to control mercantile "combinations in restraint of trade" by fixing a maximum price for provisions and other commodities. The Acta Fratrum Arvalium form an important memorial of a religious guild. A fragmentary black cippus unearthed in the Roman Forum (1899), supposedly near the grave of Romulus, aroused great enthusiasm. Its early date (550 B.C.) has been held to make for the credibility of the traditional account of Roman history as given by Livy rather than to give countenance to the skeptical method current since Niebuhr's time. Unfortunately, save for a few words of great interest for the comparative grammarian, the inscription admits of no more definite elucidation than the conviction that the words probably belonged to a religious prescript. The *graffiti* (wall-scratchings) of Pompeii form a large and interesting class of incidental inscriptions which comprises quotations, paraphrases, catchwords, proverbs; lovers' messages, complaints, tarryings, rendezvous; names and greetings. Among them the painted inscriptions (*dipinti*) contain election notices chiefly. The dialects of Latin are known almost entirely from inscriptions. The chief remains of the Umbrian language (dialect) are the Tabulæ Iguvinæ, seven bronze tablets found at Gubbio in 1444. They contain long ritual prescripts. Some 250 inscriptions, few of great importance save to the grammarian, represent the Oscan dialects. Etruscan inscriptions in considerable number have been found in Italy — one (supposedly) as far to the east as the island of Lemnos — but, pending the discovery of a long bilingual, these, though written in a well-known alphabet, still await definitive interpretation. The same is true of Iberian inscriptions (some 75 in number, several of between 50 and 150 letters). Runic inscriptions, in an alphabet derived from the Greek and Latin, have been found in Scandinavia and in England; the oldest (300 A.D) being engraved on the utensils found at Thorsbjerg, others on stone monuments, rocks, weapons, ornaments and coins; the longest containing 16 words. See RUNES.

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INSECT POWDER. See INSECTICIDES AND FUNGICIDES.

INSECTA. See INSECTS.

INSECTICIDE, any agent which destroys insects. This definition includes natural as well as artificial means of control, the latter being those operated by man. The most important of the former are adverse temperatures, excessive or insufficient moisture, fire, bacteria, fungi, mites, spiders, fish, reptiles, insects and birds. The artificial controls may be grouped according to their mode of action. Two principal groups are recognized: those intended to reach the alimentary tract through which they act, and those that act through the respiratory apparatus. The former are effective only with such insects as bite off and swallow pieces of plant tissue; the latter more or less also with these, but most frequently used upon insects which suck the plant juices from beneath the punctured epidermis. Beetles and their larvæ, caterpillars, grasshoppers, the larvæ of various saw flies (e.g., the currant worm), etc., all chew their food and have been most effectively controlled by arsenate of lead, Paris green, hellebore, etc., applied to the foliage before it becomes badly infected either as a spray or as a powder. Plant-lice, plant-bugs and other sucking insects are checked best by kerosene emulsion, whale-oil soap, tobacco extract or other substances that choke the breathing-pores in the insects' bodies. Some of these sucking insects are dreaded because of their great prolificacy, their small size and resistance to treatment. Gases are often used under favorable circumstances to reach insects troublesome in stored grain, among clothes, upon plants, in greenhouses, and even upon plants in the open air—these last being covered with tents or boxes while being fumigated. Since the development and use of the lime-sulphur wash which is an effective fungicide, San José and related scale insects have been more economically and conveniently held in check than by fumigation methods, though in California and other sections where citrous fruits are grown commercially, fumigation is still popular. Various chewing insects which tunnel through the tissues cannot be controlled by sprays, and are usually beyond the reach of gases. The leaf-miners, which burrow just beneath the epidermis of leaves and green stems, have never been effectively controlled, though the adults are sometimes held in partial check by sweetened poisoned sprays. Some borers (currant-borer) can be kept in check by burning the twigs they infest, by cutting them out of their burrows (peach-borer and squash borer), the method being suggested by the nature of attack. Other chewing insects (plum curculio) are jarred into kerosene. Lastly there are various oils and greases which are used upon animals and man to destroy fleas, lice, etc. Fir-tree oil in water and carbolic acid are also similarly employed.

Formulæ and Methods of Application.—Paris green and arsenate of lead if to be used wet should be mixed with a little water to form a creamy fluid, and then added to water or Bordeaux mixture (see FUNGICIDE), the former at the rate of one pound to 200 to 250 gallons. If to be used dry, use one part to 200 or 100 of finely sifted plaster, air slaked lime, road dust or wood ashes and mix thoroughly before applying. Arsenate of lead, the most popularly used poison, may be applied in strength varying from 4 to 10 pounds to 100 gallons of water, depending on the kind of insect to be controlled. These poisons are often sprayed on short clover or grass which is cut toward evening and spread thinly on bare ground to kill cut worms which destroy transplanted plants. A little molasses makes the bait more attractive. Hellebore may be mixed with water (1 ounce to 3 gallons) and a little glue or flour paste to increase adhesiveness. Each of these may be applied as a powder sifted on the plant, through a salt sack or blown upon them through a powder-gun. A little flour aids the sticking quality. Pyrethrum made from flower heads of certain plants of this genus is useful dry or in solution but soon loses its effectiveness. When powders are used, the plant should still be wet with dew or rain. Tobacco extract in several commercial forms is highly effective in controlling plant lice (aphis), if used before these insects have crumpled the leaves. Lime-sulphur wash, the best and most extensively used insecticide for scale insects, has also fungicidal properties. It is made by slaking and then boiling 20 pounds of quick lime with 15 pounds of sulphur in an iron kettle for one hour, then diluting with water to make 50 gallons and applying preferably while hot. There are various other formulæ. Because of the discomforts of making the mixture, commercial brands, of which there are many, are preferred by small growers of fruits. Miscible oils of many brands are very effective against San José and other scale insects. They are used at the rate of one part to 10 or 12 of water and are useful only on dormant deciduous trees when the temperature is above freezing and the trees not wet. Kerosene emulsion is made by intimately mixing a solution of hard soap (one pound to two gallons of hot water) with four gallons of kerosene, and diluting as needed for use with from 30 to 60 gallons of water. Pure kerosene and crude petroleum can be safely applied only to dormant plants, and then only upon bright breezy days, which will hasten evaporation. They have almost wholly given place to lime sulphur wash applied in winter. Whale oil soap is mixed with water (1 pound to 1 or up to 10 gallons), and applied as a wash or spray, Carbon disulphide may be used in confined receptacles where there is no danger of its inflammable fumes coming in contact with fire. An ounce is sufficient for from 50 to 75 cubic feet of air-tight space; and the exposure should be for 24 hours or longer. Hydrocyanic acid gas is prepared by adding cyanide of potassium (98–99 per cent pure) to water and sulphuric acid, one and one-half ounces for every 250 cubic feet of greenhouse; 100 cubic feet of nursery stock room and 125 feet of dwelling-house rooms, flour mills, trees, etc. Exposures may be from 30 to 60 minutes for trees, the former time being for plants in active growth, the latter for dormant ones; from 12 to 24 hours is usual for rooms, granaries, etc. Since these gases are violent poisons the greatest care should be exercised

in their application. Oils and greases are merely rubbed on infested animals and man. Boiling water is effective in destroying both lice and eggs in clothing, but the clothing must be boiled for hours to destroy the eggs of the body-louse and the crab-louse. Dust, tobacco-dust, etc., are useful in poultry houses for the birds to wallow in. Carbolic soap is the favorite remedy for insects or pet animals. But with all stock, poultry, pets and man, cleanliness is the great preventive.

For information concerning insecticides and their use consult bulletins of the various State Agricultural Experiment Stations and of the Bureau of Entomology of the United States Department of Agriculture and Farmers' Bulletins of this department; also the following books: Smith, 'Economic Entomology' (Philadelphia 1896); Johnson, 'Fumigation Methods' (New York 1902); O'Kane, 'Injurious Insects' (New York and London 1912); Sanderson, 'Insect Pests of Farm, Garden and Orchard' (New York 1912); Slingerland and Crosby, 'Manual of Insects' (New York and London 1914); Herrick, 'Insects Injurious to the Household and Annoying to Man' (New York and London 1914); 'Insects of Economic Importance' (New York 1915); Chittenden, 'Insects Injurious to Vegetables' (New York 1907).

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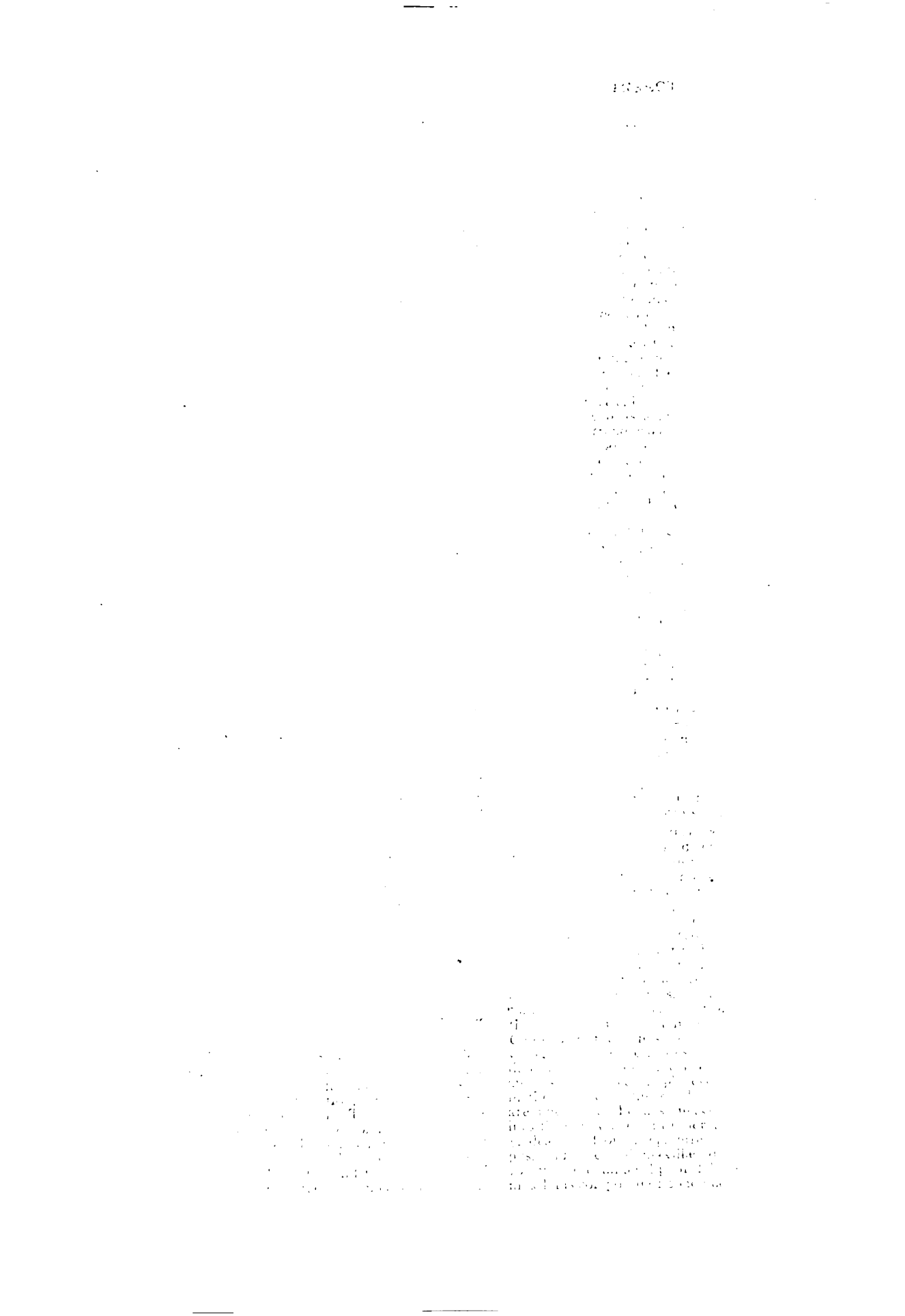
INSECTICIDES AND FUNGICIDES. See AGRICULTURAL CHEMISTRY.

INSECTIVORA, an order of mammals, all of small size, usually five-toed, more or less plantigrade, and as a rule possessing clavicles. "The snout is generally long, and is often prolonged into a small proboscis. There is a tendency for the teeth to be of a generalized type and their number is often the typical mammalian 44. Moreover, trituberculate teeth, which are certainly of an ancient form, are common." These teeth are adapted to feed on worms and insects alone. Many other evidences go to show that the type is a very old one, and Beddard thinks it may have survived because of the small size, imitative adaptiveness and nocturnal habits. Woodward speaks of the group as probably the little-altered survivors of some of the most primitive placental mammals, agreeing with the *Credonta* in their low type of brain. Most of the families may be traced back to the upper Eocene. The order falls into two divisions, (1) True Insectivores, including the hedgehogs (*Erinaceidæ*), squirrel-shrews (*Tupaiidæ*), tanrecs (*Centetidæ*), otter-shrews (*Potamagalidæ*), hutias (*Solenodontidæ*), golden moles (*Chrysochloridæ*), elephant-shrews (*Macroscelidæ*), aquatic moles (*Talpidæ*), shrews (*Soricidæ*); and (2) Dermaptera, embracing only the colugos (*Galeopithecidæ*). See HEDGEHOG; MOLE, ETC.

INSECTIVOROUS PLANTS, a collective name for plants that entrap insects and other small animals, feeding on the captures by a process of true digestion, or absorbing the results of decomposition. The best known is the Venus' fly-trap (*Dionæa muscipula*) of the order Droseraceæ. It is a native of the peat bogs of the Carolinas. The halves of the leaf blade are movable on the mid-rib, and furnished on each margin with teeth. On each half of the blade are three sensitive hairs, and the whole surface is thickly set with digestive glands. Immediately an insect touches one of these hairs the blades close, the teeth interlock, the glands exude their digestive juice on the insect, and the products are absorbed. In the common sundew (*Drosera rotundifolia*) the same result is obtained by means of stalked glands, which also function as tentacles, bending over to secure the prey; and in the butterwort (*Pinguicula vulgaris*) the margins of the leaf are the agents of capture, while the digestive juice is excreted by stalked and sessile glands on the leaf blade. *Aldrovandia vesiculosa,* an aquatic plant of southern and central Europe, has leaves which function like those of Venus' fly-trap. Drosophyllum lusitanicum, a native of Portugal and northwestern Africa, has stalked glands as well as sessile, but they do not bend over to confine prey. Their viscid secretion acts as a digestive ferment as well as a means of capture. Bladder-wort (*Utricularia*) is a floating plant common in lakes and pools. The traps or bladders, found on the submerged branches, are modified leaf organs, and present a general resemblance to the commonest prey water-fleas. The trap is entered by a door, which opens inward, but not outward, so that escape is impossible. The products of decomposition are absorbed by the cross-shaped cells lining the inner surface of the bladder. In the pitcher plants compound leaves are modified into pitcher-like receptacles, sometimes with a lid, as in the common *Sarracenia purpurea* and the southern *S. flava,* both growing in bogs. The attractions for insects are bright colors, and glands secreting nectar. Beneath the sweet bait is a slippery surface, affording insecure foothold, and insects pitching thereon fall into the secretion at the bottom. In the Old World genera Nepenthes and Cephalotus there appears to be a true digestive process; in the group of which the American genus Sarracenia is the only type, the products of decomposition are absorbed, and in the genus Dischidia, from India and Australia, pitchers store water for use by the plant. Consult Darwin, 'Insectivorous Plants.' See CARNIVOROUS PLANTS.

INSECTS (Lat. *insectum*), a class of *Arthropoda* characterized by the body being divided into three regions, that is, a head, thorax and hind-body or abdomen, and by the presence, in all but the more primitive and certain degraded forms, of wings, and of three pairs of thoracic legs. The body of insects consist of 21 segments (somites) of which six are used together to form the head, while there are three thoracic and from 10 to 12 abdominal segments. To the head are appended five pairs of jointed appendages, that is, the antennæ, mandibles and two pairs of maxillæ, while in the embryo of certain insects and in the adult *Campodea,* there has been detected a pair of vestigial appendages. Besides these appendages, there are two compound eyes, one on each side, and usually three simple eyes (ocelli) situated in the middle of the head. While the antennæ are undivided the first maxillæ are subdivided into three branches, an inner (lacinia), a middle (galea), and outer (palpifer), bearing the palpus. The second maxillæ are fused together, forming the under lip or labium; each second maxilla is composed of a lacinia, the palpus, while



PROTECTIVE MIMICRY AMONG INSECTS

vestiges of the galea occur in certain forms. In bees certain accessory appendages called paraglossæ are present. Besides the maxillæ, the so-called tongue or hypopharynx is present, being highly developed in bees; it lies on the under side of the mouth, just above the labium; in caterpillars it receives the end of the salivary duct, and is called the spinneret. Attention should also be called to the upper lip or labium, on the under side of which is the epipharynx, which bears minute taste-pits. The thorax consists of three segments, which can be easily distinguished in the primitive wingless forms (*Campodea*) and in the cockroach and locust, but in the more specialized forms as beetles, moths, bees and flies, the segments are more or less fused together and, owing to the movements of the wing muscles, are subdivided into many separate pieces. In the wasps and bees the basal abdominal segment becomes toward the pupa state transferred to the thorax. The legs as a rule end in five jointed tarsi, the last joint bearing a pair of claws with a cushion (pulvillus) between them. Insects are enabled to walk on glass, etc., by means of a sticky fluid exuded from the ends of hollow hairs fringing the cushion. They climb by means of their claws.

Insects differ from all other animals except birds and bats in possessing wings, and their presence, especially that of the muscles of flight, have greatly modified the shape and structure of the thorax. The front pair of wings is attached to the middle thoracic segment (mesothorax) and the hind wings to the metathorax. In the two-winged flies (*Diptera*) the second pair of wings are reduced and modified to form the balancers (halteres). The wings are flat sac-like outgrowths of the skin, and are strengthened by the "veins" which form hollow rods. These veins contain a trachea, so that there is a space between the air-tube and the outer wall. When the insect emerges from the nymph or the pupa, the vein is filled with blood. The spaces enclosed by the veins and their cross-branches are called cells, and their shape often affords valuable generic and specific characters. In the more primitive insects there are numerous cross-veins, and such wings as in locusts, etc., are said to be net-veined. In the *Lepidoptera* there are few cross-veins. In the *Diptera* and *Hymenoptera* the number of veins is limited, the cells also being few. The skin of insects is hard, dense and elastic, due to the deposition of chitin.

Internal Anatomy.—One of the distinctive characteristics of insects is their mode of respiration. This is effected by an intricate system of internal air-tubes (tracheæ), which are filled with air by openings (spiracles) in the sides of the body; of these spiracles there are from one to two pairs in the thorax, and eight pairs in the abdomen. The tracheæ are kept permanently open by a series of threads (tænidium) each of which makes from three to five turns around the thin tube; in this way the entire tracheal branch is provided with what at first was supposed to be a continuous spiral thread. The slit-like openings of the spiracles are guarded by a grate of stiff hairs to prevent the ingress of dust, etc. It should be borne in mind that no insect breathes through its mouth, but through the spiracles. Hence the efficacy of all oily or greasy substances in destroying every kind of insect in whatever stage of growth; wherever the oil touches the body a thin film spreads over it, covering the air-openings so that the insect soon dies by asphyxiation. Though insects have a delicate pulsating tubular heart, they have no arteries and veins, since the air in the tracheæ seeks the blood in the remotest parts of the body. The blood is thin and colorless. The aquatic larvæ and a very few perfect insects breathe by external tracheal gills, the spiracles being in such cases often absent. The genital opening is always situated near the end of the body, in front of the vent on the under side. Besides a complicated digestive canal, insects have urinary tubes opening into the end of the intestine.

The nervous system consists, besides the brain, of a chain of ganglia the greatest number of which is 13, but which become more or less fused in the more specialized groups, especially in the flies. The brain is remarkably complex, in accordance with the varied and complicated movements of the segmented body and jointed appendages, all capable of different kinds of motions.

Sense of Sight.—The compound or facetted eyes (ommatea) are composed of numerous simple eyes called ommatidia, which vary in number from 12, in *Lepisma*, to 20,000 in the dragon-fly (*Æschna*), and even 25,000 in a beetle (*Mordella*). Yet notwithstanding the wonderful complexity of these compound eyes, most insects are near-sighted, and perceive rather the movements of other animals than their exact outlines; the dragonfly and butterfly can see for a considerable distance. The simple eye probably only enables the insect to distinguish daylight from darkness, or at most very near objects. Insects, like bees and butterflies, have the color-sense, and prefer certain colors to others.

Sense of Smell.—Insects are chiefly guided by the sense of smell. This resides in the antennæ, in which there are microscopic pits filled with fluid; to this pit goes a fine nerve whose fibres end in staff-like sense cells. The number of these olfactory organs is in some insects enormous; thus in the European cockchafer there are 39,000 in the leaves of the male antennæ, and about 35,000 in those of the female; in a single antennæ of the hornet (*Vespa crabro*) are about 13,000 to 14,000. In the cockroach the abdominal cerci or feelers also possess such pits.

Sense of Hearing.—The auditory organs of the locust are drum-like ears situated one on each side of the base of the abdomen, directly behind the first abdominal spiracle; in the green grasshopper, katydids, etc., a little auditory sac is lodged in the fore-legs (*tibiæ*). It is supposed that most insects are destitute of the sense of hearing, at least auditory structures have not yet been detected; yet all sound-producing insects must have ears to hear.

Sense of Taste.—The taste organs are little pits or papillæ which resemble the olfactory organs, but which occur on the inside of the upper lips, on the epipharynx, or at the base of the proboscis and maxillæ in the bee.

The Egg and Growth of Insects.—The eggs and the fertilizing fluid of the male are produced in glands which open near the end of the body on the under side. The eggs are de-

posited by the female in the earth or in wood, leaves, etc., by means of the ovipositor, an apparatus composed of three pairs of hard appendages, and which in the wasps and bees form the sting. Most insects die on the approach of cold weather, when they lay their eggs, the species being represented in the winter by the eggs alone. The eggs hatch in spring, the embryo passing through remarkable changes.

Metamorphoses.— Most insects after hatching pass through a remarkable series of changes called a metamorphosis. The small flies, moths or beetles are not the young of large ones, but adult insects, while the most primitive insects have no marked metamorphosis, the mature locust only differing from the young in having wings; the more specialized forms as beetles, moths, wasps, bees and flies, pass through two stages of growth, that is, the larva and pupa, before becoming winged and sexually mature.

Larva.—The name was first given by the ancients to the caterpillar because they thought it masked the form of the perfect insect. Swammerdam supposed that the larva contained within itself "the germ of the future butterfly, enclosed in what will be the case of the pupa, which is itself included in three or more skins, one over the other, that will successively cover the larva." But the discovery by Weismann (q.v.) of the germs of the imago (imaginal discs or buds) in the larva completely changed our notions of the nature of metamorphosis (q.v.), and revolutionized our knowledge of the fundamental processes concerned in the change from larva to pupa or chrysalis, and from pupa to imago. Not only are the larvæ of each order of insects characteristic in form, so that the grub or larva of beetles is readily distinguished from the larvæ of other groups, or the maggots of flies from the footless larva of ants, wasps and bees, but within the limits of the larger orders there is a great diversity of larval forms, showing that they are the result of adaptation to their surroundings and mode of life.

The larvæ of nearly if not all the metabolous animals are probably secondary in their origin. Fritz Müller (q.v.) pointed out that this is the case with the larvæ of the higher insects. The larva of a beetle is popularly called a grub; that of a fly a maggot. The young of the more primitive insects, such as the cockroach, locust, all bugs, etc., which undergo an incomplete metamorphosis, is called a *nymph*. See LARVA.

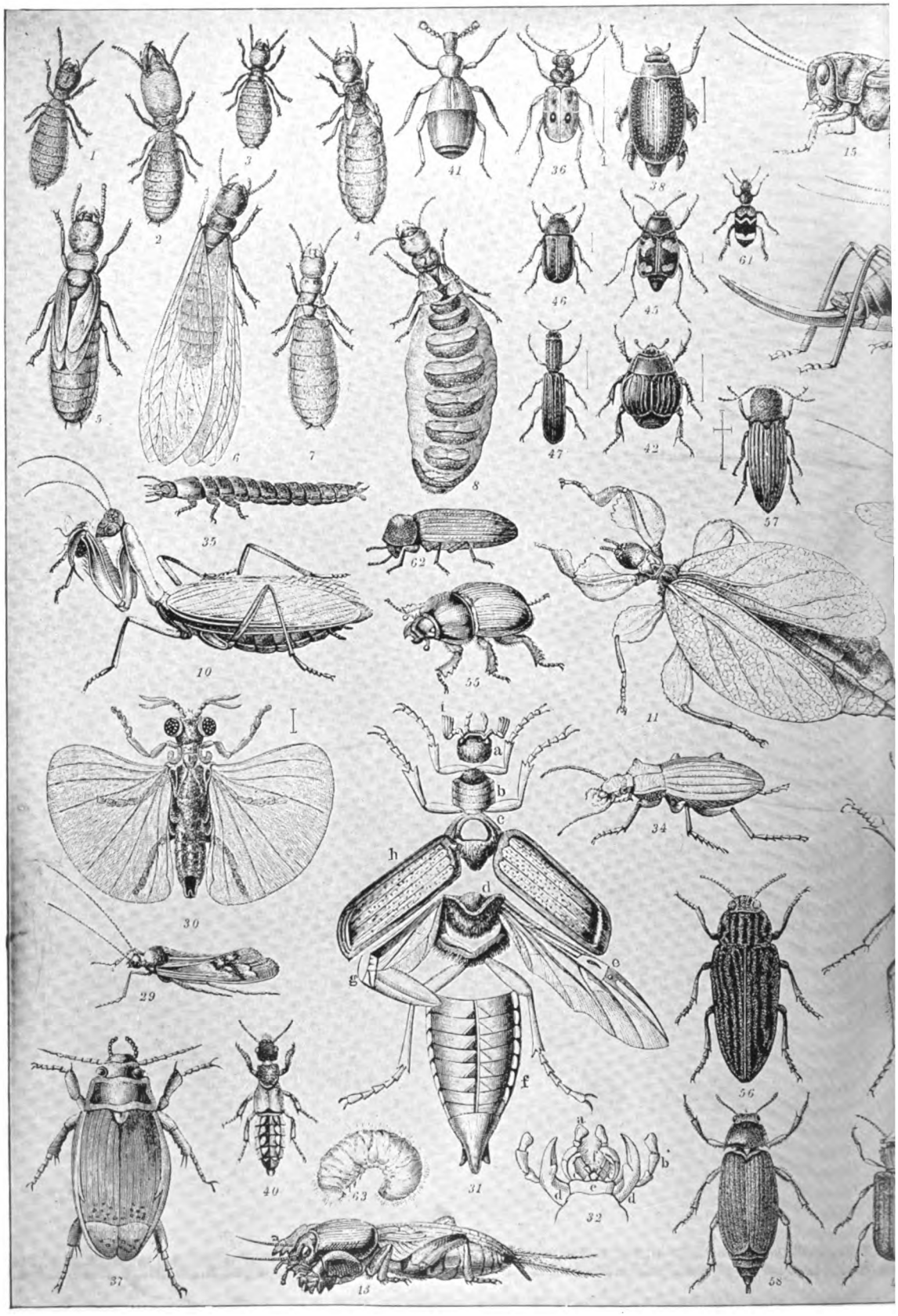
Pupa.— The word pupa is Latin, meaning baby. Linnæus gave it this name from its resemblance to a baby which has been swathed or bound up, as is still the custom in southern Europe. The term pupa should be restricted to the resting, inactive stage of the holometabolous insects, that is, those with a complete metamorphosis. The typical pupa is that of a moth or a butterfly, popularly called a chrysalis. A lepidopterous pupa in which the appendages are more or less folded close to the body and soldered to the integument, was called by Linnæus a *pupa obtecta;* and when the limbs are free, as in Neuroptera, Mecoptera, Trichoptera, and the lepidopterous genus Micropteryx, it is called a *pupa libera.* When the pupa is enclosed in the old larval skin, which forms a pupal covering (puparium), the pupa was said by Linnæus to be *coarctate.* The pupa of certain Diptera, as that of the orthoraphous families, is nearly as much obtected as that of the tineoid families of moths, especially as regards the appendages of the head, the legs being more as in pupæ liberæ. The pupæ of Coleoptera and of Hymenoptera, though there is, apparently, no near relationship between these two orders, are much alike in shape, and, as Chapman pertinently suggests, those of both orders are helpless from their quiescence, and hence have resorted for protection to some cocoon or shell. But it is quite otherwise with the pupæ of Lepidoptera and Diptera, which vary so much in adaptation to their surroundings, and hence afford important taxonomical and phylogenetic characters. This, as regards the Lepidoptera, was almost wholly overlooked until Chapman called attention to the subject, and showed that the pupæ had characters of their own, of the greatest service in working out the classification, and hence the phylogeny of the different lepidopterous groups. The pupæ of the Neuroptera, Coleoptera and Hymenoptera differ structurally from the imago, in the parts of the head and thorax being less differentiated. Thus in the head the limits of sutures between the epicranium and clypeus, and the occiput and gula, are obscurely marked, while the tergal and pleural sclerites of the imago are not well differentiated until the changes occurring just before the final ecdysis. It is easy, however, to homologize the appendages of the pupæ with those of the imago of all the holometabolous orders except in the case of the obtected pupæ of the Lepidoptera (and probably of the obtected dipterous pupæ), where the cephalic appendages are soldered together.

Classification of Insects.— The number of known species of insects is from 200,000 to 300,000, but it is estimated that there are upward of a million species now living. In fact, the class of insects vastly outnumbers all other groups of animals. This is probably due to their being winged, and to their great fecundity. At present the class of insects is divided into two subclasses, that is, the (1) *Synaptera,* represented by the wingless orders Thysanura and Collembola; and (2) *Pterygota,* comprising 15 winged orders and which may be thus tabulated

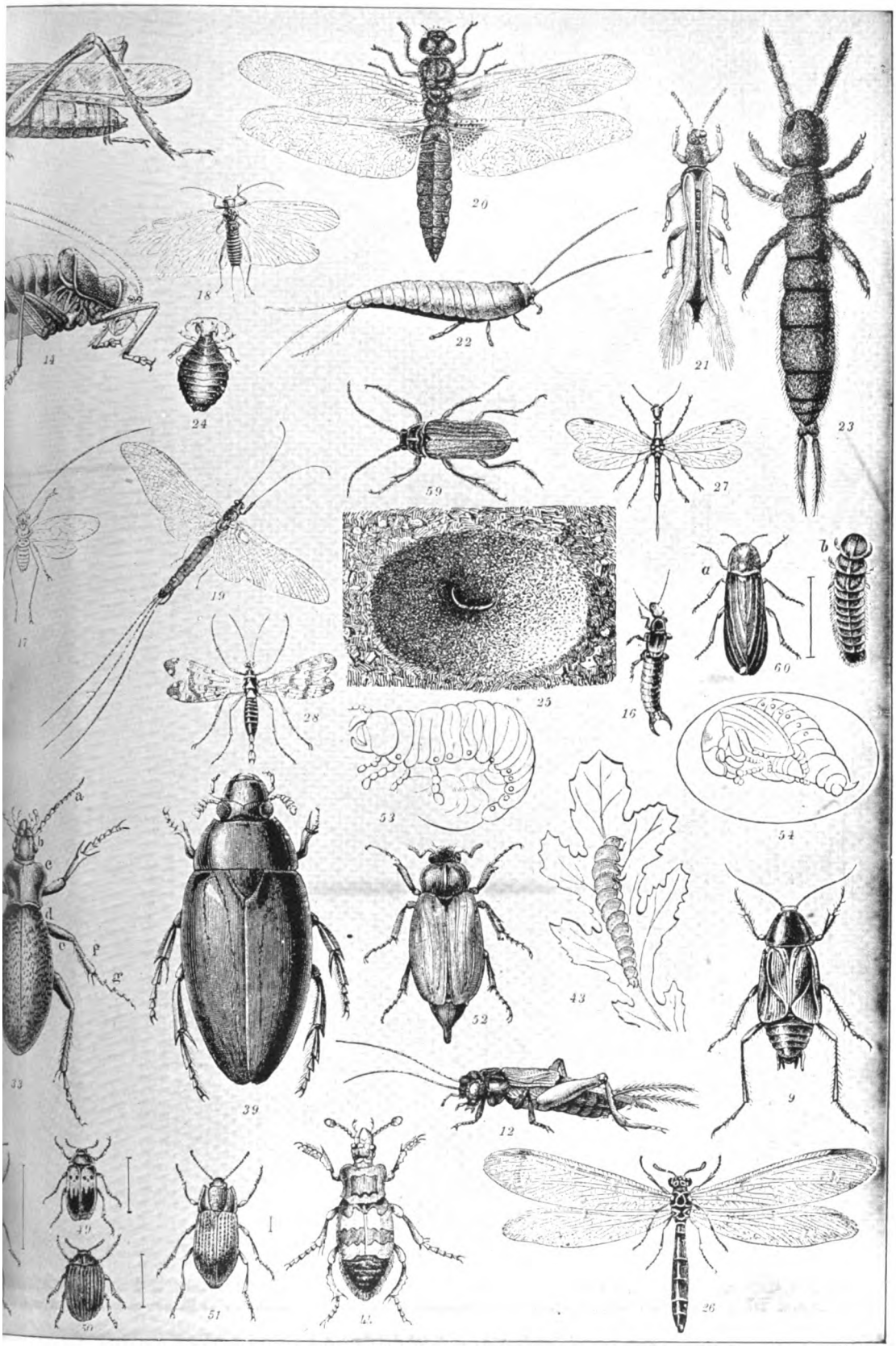
Series 1.— *Heterometabola,* with an incomplete or variable though slight, degree of metamorphosis. No distinct larva or pupa state, the young being nymphs.
- Order 1. Dermaptera. (Earwig).
- " 2. Orthoptera. (Cockroach, locust, grasshopper, stick insect).
- " 3. Platyptera. (Bird lice, Perla, white ant).
- " 4. Odonata. (Dragonfly).
- " 5. Plectoptera. (Mayfly).
- " 6. Thysanoptera. (Thrips).
- " 7. Hemiptera. (Bugs).

Series 2.— *Holometabola,* or with a complete metamorphosis.
- Order 8. Neuroptera. (Corydalus, lace-wing fly, ant-lion).
- " 9. Mecoptera. (Panorpa, Boreus).
- " 10. Trichoptera. (Caddis flies).
- " 11. Coleoptera. (Beetles).
- " 12. Lepidoptera. (Moths and butterflies).
- " 13. Siphonaptera. (Flea).
- " 14. Diptera. (Mosquito, fly).
- " 15. Hymenoptera. (Saw-fly, ant, wasp, bee).

Fossil Insects.—About 3,000 species of fossil insects have been described, of these from 200 to 300 are Palæozoic, 500 Mesozoic and the remainder are Tertiary. The oldest fossil insect-remains is the wing of a supposed bug (*Protocimex*) from the Ordovician of Sweden. The wing of a cockroach (*Palæoblattina*) has been



Figs. 1–8 Termites 9 Cockroach 10 Mantis 11 Leaf Insect 12 Cricket 13 Mole-cricket 14 Grasshopper 15 M
23 Glacier-flea 24 Bird-tick 25, 26 Ant Lion 27 Inocellia 28 Scorpion-fly 29 May-fly 30 Xenos 31
38 Whirlwig 39 Hydrophilus 40 Rove-beetle 41 Claviger 42 Hister 43 Larva of Carrion-beetle
51 Ground-beetle 52, 53, 55 Dung-beetle 54 Cockchafer, Larva and Pupa 56 Chalcophora 57 A



tory Locust 16 Earwig 17 Psocus 18 Perla Bicaudata 19 Ephemera 20 Dragon-fly 21 Thrips 22 Fishscale
Coleoptera 33 Carabus Coriaceus 34, 35 Carabus Auratus and Larva 36 Tiger-beetle 37 Great Water-beetle
rrying-beetle 45 Scaphidium 46 Nitidula 47 Colydium 48 Cucuius 49 Dermestes 50 Pill-beetle
s Segetis 58, 59 Cebrion 60 Glow-worm 61 Clerus Formicarius 62–66 Death-watch and Larva

detected in the middle Silurian of Calvados, France. From the Devonian shales of Saint John, N. B., nine species of primitive net-veined insects have been collected. The coal measures are characterized by cockroaches, primitive dragon-flies, May-flies and grasshopper-like forms, phasmids, etc., also occurring. All of the Palæozoic insects known are very primitive. Modern forms, those having a complete metamorphosis, begin to appear in the Triassic and Jurassic, where remains of beetles, a saw-fly and a moth occur. Ants, bees and butterflies date from the Oligocene and Miocene Tertiary. See FRESH-WATER INSECTS; MARINE INSECTS, and the names of groups and species, as FLIES, HYMENOPTERA, MOTHS, etc.

Bibliography.— The latest general works on insects are Carpenter's 'Insects, their Structure and Life' (London 1899), and Sharp's 'Insects' (Vols. V and VI of Cambridge Natural History 1895–99); both contain sufficient references to other works. For American insects consult Packard's 'Text-book of Entomology' (1898), and 'Guide to the Study of Insects' (1889); Comstock's 'Manual for the Study of Insects' (1895); 'Insects and Crustacea' (Vol. II, Standard Natural History 1884); Howard's 'The Insect Book' (1901). The last named contains a copious bibliography, especially to the voluminous publications of the Entomological Division of the United States Department of Agriculture.

INSECTS, Eggs of. See EGG.

INSECTS, Fungi Affecting. See FUNGI.

INSECTS, Injurious and Beneficial. See ENTOMOLOGY, ECONOMIC.

INSECTS, Propagation of Diseases by. See FILIARISIS; FLIES; MOSQUITOES; MYIASIS, ETC.

INSECTS AND FLOWERS. See FLOWERS AND INSECTS.

INSECTS OF IMPORTANCE TO MAN. Startling as it may at first seem, it is nevertheless a fact that insects comprise the largest group not merely of all land animals but of all living creatures. The late C. V. Riley, curator of insects in the United States National Museum, estimated that the world's insect census contains 10,000,000 species. Later estimates, however, considerably reduce this number but the most conservative figure is 2,000,000 of which more than 350,000 have been named and described, including more than 25,000 native to North America. These latter figures are being increased at the rate of several thousand annually through the taxonomic work of entomologists.

Since the habits of insects vary widely it is natural to expect to find many species that directly or indirectly affect human interests. Of these the most useful are those (1) that fertilize the flowers of plants whose fruits or seeds or the crops grown from these are employed by man for food or other purposes; (2) those that manufacture or secrete or whose bodies constitute products similarly utilized; (3) those that prey either as parasites or predaceous enemies upon other insects or animals which destroy cultivated plants or plant products, domestic animals or their products; (4) those that act as scavengers of dead animal and vegetable matter, including the excrement of other animals; (5) and those that directly or indirectly change the character of the soil in which they pass at least part of their life history.

The first group includes a great many minute and a smaller number of large sized insects that affect man little or not at all in any other way. Were it not for them, however, very few plants, as Darwin and other noted investigators have proved, would form seeds or bear fruits. Most conspicuous perhaps of all these is the blastophaga or fig-wasp, upon which the caprification or fertilization of the Smyrna fig depends and for lack of which this choicest of all figs has until very recently failed to set fruit in America. Most conspicuous in the second group are bees which, according to Herrick, are kept by 3,000,000 beekeepers in the United States and yield honey to the value of over $25,000,000 annually — $2,000,000 in New York State alone. These insects also supply large quantities of beeswax which is used in the arts. In the second group are also the scale insects which supply certain fine waxes, cochineal, lac and its accompanying purple dye and some other materials. In the third group (predaceous and parasitic insects) are countless species belonging to the orders Hemiptera (for instance, assassin-bugs and water striders), Neuroptera (lace winged flies and ant lions), Orthoptera (praying mantis and cockroaches), Odonata (dragon-flies), Diptera (robber-flies and tachina-flies), Coleoptera (lady-bird beetles and tiger beetles) and Hymenoptera (ichneumon flies and spider wasps). In group four are many species of scavenger beetles and flies the larvæ, and in many cases also the adults, of which mimic the rôle of turkey buzzards, vultures and other creatures that feed on carrion. In group five are the larvæ of many beetles (June bugs) and moths (cutworms) which live in the soil.

While these directly or indirectly useful insects include some of the greatest benefactors of the human race, they number at most only a few hundred species, while those that play harmful rôles may be numbered by the tens of thousands. The great majority of these, the most destructive and often the most spectacular in their performance, are those that destroy cultivated crops. Martatt in the Year Book of the United States Department of Agriculture (1904, page 461) declares that the losses caused by insects in the United States alone nearly equal the then running expenses of the national government and were more than the annual cost of the schools of this country. According to Sanderson, who in his book, 'Insect Pests of Farm, Garden and Orchard,' goes into detail, the annual damage done by insects to cereals is $300,000,000; to animal products an equal amount; to products in storage $200,000,000; to forests and their products, $100,000,000; to cotton, $85,000,000; to hay and forage, $66,500,000; to truck crops, $60,000,000; to fruits, $30,000,000; to farm forests, $11,000,000; to tobacco and miscellaneous crops, each $10,000,000; to sugars, $9,500,000, an annual total of $1,182,000,000. Other estimates differ widely from these figures. For instance, Quaintance places the annual loss to deciduous fruit interests at more than $66,000,000. Texas loses annually $25,000,000 through the Mexican cotton boll weevil, an insect which has been spreading to other parts of the cotton belt and which,

it is figured, will sooner or later cost this area at least 10 times this amount annually. Webster totals the losses of cereals for 15 years due to the work of chinch bug at $350,000,000. Herrick says that the codling moth whose larvæ make wormy apples and pears destroys more than $12,000,000 worth of fruit a year.

These are but a few typical direct losses. To them must be added the cost of fighting destructive insects. To spray apple trees for the codling moth alone $4,000,000 is spent annually, to combat the San José scale $10,000,000. The New England States and the national government have already expended $7,000,000 to check the ravages of the brown tail and the gypsy moth and are spending $1,000,000 annually in this warfare. And so on almost *ad infinitum;* for every important crop has its insect enemies. Nearly 300 prey on the apple, on clover and grape each 100, on sugar beet 70, on cherry and plum each 50, to mention only a few instances.

Another important group of destructive insects includes those species that attack domestic animals, scarcely one of which but has its parasites. Some of these insects feed more or less indiscriminately upon several species of animals; others are specific to one species or a few closely related ones. Often horses, cattle and sheep are so seriously parasitized that they die, to say nothing of being weakened when less seriously attacked. The stomach and intestines of the horse are frequently so infested with botfly larvæ that it is a wonder the animal lives, much less works. The hides of cattle are often ruined because cattle botfly larvæ feed beneath the skin on the animals' backs. When the nasal passages and other head parts of sheep become densely populated by another species of botfly the animals often go insane and die. In addition to these are hornflies, gadflies, screw worm flies, lice, fleas and many other domestic animal pests, some of which may not directly cause death but all of which reduce vitality, thus wasting energy and food necessary to keep the animals in good condition. At the same time these pests may carry the germs of disease.

All this damage wrought by insects to cultivated crops and to domestic animals implies inestimable money losses. But to it must be added the also inestimable injuries to manufactured products. Naturally the first thought concerns the injuries to foods; these undoubtedly suffer most for nothing is safe unless stored in receptacles through which insects cannot burrow or thrust their eggs. But many other articles manufactured from organic materials are destroyed by insects. Certain species of insects attack wood whether used in the construction of buildings, furniture or implements. In some tropical countries termites or white ants, working always beneath the surface, devour wood until collapse occurs, thus furniture and even houses that become infested with them soon cease to be safe for human uses. In short everything of organic origin has its enemies; even books and drugs do not escape.

There are yet other important rôles which insects play — those in which they attack man directly or infect him with disease, the germs of which they carry upon or in their bodies. Because of commercial intercourse scarcely any habitable region of the globe is free from such insects as house flies, fleas, mosquitoes, bedbugs and others equally or more annoying and dangerous. Some of these species attack by means of jaws (fleas), by beaks (lice and bedbugs), by ovipositors (wasps, bees and the stinging species of ants), in most of which cases a poison is injected into the wounds though in others the mere bite or puncture is enough to produce irritation of the injured part. In other cases the insects are provided with hairs which produce a nettling or urticating effect as in the case of many caterpillars, notably those of the brown tailed moth. Again, some beetles when crushed blister the skin, for instance "Spanish fly," or cantharides used in medicine. Bees and wasps though capable of inflicting considerable pain, and, in extreme cases of highly nervous persons, even death, rarely attack human beings unless in defense of themselves or of their homes. In such cases the immediate application of an alkali such as ammonia is the best remedy.

Important as the direct attacks of insects upon man are, they are however less serious in their effects than the indirect ones; for insects which prey upon man or as in the case of the house fly, often play more important indirect rôles than on account of their mere bites or stings or contact with the human skin or with food. Certain species of Oriental mosquitoes carry such maladies as the filaria diseases of the East (chyluria, elephantiasis and lymph scrotum), others impart malaria, yellow and dengue fevers. House flies in Egypt and the Fiji Island carry purulent conjunctivitis; in other parts of the world they also spread typhoid fever and Asiatic cholera; tiny hippelate flies disseminate "pink eye" in the southern United States; fleas are said to spread bubonic plague; tabanid and stomoxyd flies are charged with disseminating anthrax by means of specific bacilli just as cucumber beetles spread the wilt or blight of cucumbers and canteloupes and as bees and other nectar feeding insects spread the fire blight of pears, apples and quinces. From these few examples, therefore, the importance of insects to man assumes a very threatening aspect. Taking this list as a whole the housefly is probably the worst offender simply through its world-wide distribution. Because of its filthy habits (the larvæ being developed in manure, the adults carrying this matter upon their bodies), and because it not only soils the surfaces upon which it alights but pollutes the human food upon which it feeds in the adult state, it is fought by cleanly housewives the world over. The cost of keeping it out of American homes is estimated by Herrick to be $10,000,000 annually. To this figure must be added the cost of fly traps, poisons and other methods of control. Similarly the cost of control of such filth carrying insects as roaches, and of such parasites on human beings as bedbugs, fleas and lice doubtless equals this enormous figure.

In spite of these expenditures, however, the number of species of our insect foes is on the increase. One cause of this is the change of conditions due to cultivation of crops. Conspicuous among the innocuous insects that have developed destructive habits is the Colorado potato beetle which in its native condition fed upon nettles and other plants of no consequence

to man, but transferred its appetite to the Irish potato and the egg plant when these were introduced into its original habitat. Though now the principal insect enemy of these crops and though largely held in check by systematic spraying with poisons, it still costs the country millions of dollars in reduced crops and in expenditures for materials, machines and labor to keep it in check.

A more important factor than change of habit in the increase of our insect foes lies in commercial intercourse with foreign countries, more especially those of Europe, whose insect pests are thus accidentally imported or exported. Herrick is authority for the statement that out of 73 of our worst insect pests 37 or more than half have been imported from foreign countries. Conspicuous among these are San José scale from Australia, cotton boll weevil from Mexico, gypsy moth, currant worm, wheat midge, clover midge and Hessian fly and many others from Europe. In similar manner, but to a much smaller extent, America has disseminated insects in foreign countries. Most conspicuous among these is probably the phylloxera or root louse, which for over 200 years, as discussed in 'Evolution of Our Native Fruits' by Bailey, was a leading agent in preventing the successful commercial cultivation of European grapes in the eastern half of the United States and thus indirectly led to the development of our native species of grapes, and which when accidentally exported to Europe wrought havoc among the established vineyards, particularly of France, and thus led to the practice of grafting European varieties on American stocks, thereby not only saving the French wine industry, but also making it possible to grow European varieties on a commercial scale in the United States and perhaps in Canada. Such cases as these being possible of repetition at any time have led to the establishment of national and State regulations with respect to interstate and international transportation of nursery stock and the employment of trained men to examine such stock where grown and at ports of entry. Not only have the United States and Canada passed such laws and appointed inspectors, but many other countries are now similarly provided.

Because insects in all these enumerated ways and many others profoundly affect human interests, especially those which relate to agriculture, to manufactured organic materials, to health and to the products of such species as bees and scale insects, it is but natural that the new branch of economic entomology should have been developed as probably the most important division of biology, certainly of the animal side of this great subject. In no country of the world has the necessity for such development been so great as in America, especially in the United States. This is not only because of the enormous area of this nation, the great variety of products grown, nor the differences of climate, nor even a combination of all these factors, but also largely because the country is comparatively new, because the insect pests introduced from other countries have generally been brought in without the natural enemies that kept them more or less under control where they were indigenous, and finally because many of our native species have left their original food and developed tastes for the new plants, animals or the products of such brought within tempting reach of them. While economic entomology had its inception in Europe, necessity and American progressiveness and inventiveness have so fostered and encouraged it on this side of the Atlantic that the United States not only leads the world in its insect investigations and successful methods of control, but it employs a larger force of official economic entomologists than do all other countries of the world put together.

Still further, economic entomology is one of the leading subjects in the curriculum of all leading agricultural colleges and schools because it is required that all teachers and investigators of agriculture, all farm bureau or county agents, all agricultural extension specialists, and all inspectors of nursery stock, must have as thorough a grounding in this subject as in botany, chemistry and physics in order to hold staff positions in the National Department of Agriculture, those of the respective States, or in the colleges and schools which teach agriculture from the practical standpoint. Herein lies another item of expenditure that aggregates millions of dollars annually and thereby increases the enormous figures presented. But all this expenditure and study is necessary and justified because it is essential to man's well being that these foes shall be destroyed in order that man may have his rightful dominion over the earth and its creatures.

For methods of controlling insects (see INSECTICIDE) under which title will also be found a list of important books and other writings which deal with the control of these creatures by natural and artificial means.

M. G. KAINS,
Horticultural Consultant.

INSESSORES, in-sĕ-sō'rēz, a discarded term in Ornithology designating a group styled "perchers," which included the majority of the smaller and more familiar birds. The term has been abandoned because the group denoted by it is a purely arbitrary one.

INSIDIOUS FLOWER-BUG. See FLOWER-BUG.

INSIGNIA. See MILITARY INSIGNIA.

INSKIP, John S., American clergyman, evangelist and editor: b. Huntington, England, in 1816; d. Ocean Grove, N. J., 7 March 1884. He was brought to America in 1820, the family settling first at Wilmington, Del., and then at Marshallton, Pa. In 1836 he entered the ministry of the Methodist Episcopal Church, joining the Philadelphia Conference, and serving prominent churches in that Conference, the Ohio, the New York East and the New York Conferences. When pastor at Springfield, Ohio, he introduced the custom of having families sit together. Previous to this men sat on one side of the church and women on the other in Methodist worship. He was tried and censured by his Conference, but appealed to the General Conference of 1852 which exonerated him. He was chaplain of the Brooklyn 14th regiment the first year of the war but resigned on account of poor health. From 1873 until his death he was editor of *The Christian Standard and Home Journal* of Philadelphia. He was one of the founders of the National Campmeeting Association and personally conducted more than 50 camp meetings. He was

an evangelist of unusual ability. In 1881–82 he took an extended evangelistic tour, conducting meetings in England, India and Australia, traveling in the year 31,000 miles, conducting over 500 public services, and witnessing over 5,000 conversions. He wrote more than 160 columns of editorial matter for his paper on the trip and conducted an extensive correspondence besides. He was the author of 'Methodism: Explained and Defended' (Cincinnati 1851); 'Songs of Triumph' (Philadelphia 1882). Consult McDonald, William, 'Life of John S. Inskip' (Boston 1885).

INSOLATION, heating by direct exposure to the sun's rays. In geology it has significance in the process of weathering by heating and cooling of rock surfaces with resulting expansion and contraction and shattering of the rock mass. See EXFOLIATION.

INSOLVENCY. In a popular sense the word insolvency applies only to persons without property or means sufficient to satisfy their creditors. The legal definition embraces all who are unable to pay their debts at maturity in the ordinary course of business, even though they may possess assets exceeding their liabilities. A failure to meet overdue obligations renders a person liable to proceedings against him in a court of insolvency, in which his assets may be taken into the possession of the officers, marshaled and distributed to his creditors. Should there be an amount in excess of what is required to pay the creditors and the expenses of administration, the balance so remaining is the property of the debtor. From a very early period in the history of civil government, laws have existed providing for proceedings by creditors against insolvent debtors, by which the debtor's property could be taken from his possession, to be held by another as a trust fund to be applied to the payment of his just debts. In case of an insufficient amount to pay all debts in full, provisions are usually made for a *pro rata* distribution. These laws have generally provided for classes of preferred debts, payments of which were to be made in full, even though such payments exhausted the entire assets. Preferred claims commonly included all claims of the government or state, and often claims for labor to a limited amount, and claims for the necessaries of life. Provisions are usually made for the exemption of certain articles to the use of the debtor, not to be included in the assets. The Constitution of the United States provides that Congress may establish uniform laws on the subject of bankruptcy throughout all the States, and the first act upon that subject was passed in 1800, since which time there has been some Federal bankruptcy law, with brief interregnums. A uniform national law upon the subject now exists. The first act of Congress upon this subject provided for proceedings by the creditors only, but in 1841 an amendment provided for voluntary proceedings by the debtor, by which he could surrender his property and obtain a discharge from all of his debts, provided he had been guilty of no fraud. In the absence of a national law on the subject of insolvency, the States all have authority to enact and enforce laws upon that subject. The Federal act now provides for voluntary proceedings by the debtor, as well as proceedings against him by the creditors, with provisions for his discharge. The various State acts have usually contained such provisions. The Federal act during its continuance suspends all State insolvency laws covering the same ground. See BANKRUPTCY LAWS.

INSOMNIA, a disordered condition of the body characterized by sleeplessness. It may be due to toxic condition, mental or physical exhaustion, or other causes. The usual treatment is directed to removing the cause. Hot baths, hot food, applying heat to the soles of the feet are also applied with considerable success in many cases. See SLEEP.

INSPECTOR, or **INSPECTOR-GENERAL,** in military affairs, terms of somewhat vague significance. There are inspectors-general of cavalry, infantry, artillery, engineers, aviation, militia and volunteers, whose duties are really those which their names infer — viz., the periodical inspection of the several corps of their respective arms, and the pointing out of deficiencies, the corps being under command, however, of its own officers, and not of the inspector-general. The inspectors-general of musketry and gunnery instruction are charged with the direct superintendence and ordering of such instruction throughout the army. In the medical department the inspectors-general of hospitals constitute the highest grade of surgeons. See ARMY ORGANIZATION.

INSPIRATION, in theology, the communication by the Holy Spirit, to writers and speakers, of a portion of the knowledge and feeling of God, in such fashion that they can be communicated to other men; especially used in relation to the Bible. On the fact of inspiration rests all attribution of divinity to the sacred writings above any others; but theories of its method and extent have necessarily changed with the advance of critical knowledge. They have never had an authoritative pronouncement even from the Catholic Church which allows liberty of judgment on this; the Bible not holding the supreme place there as in Protestant bodies, and the latter being too divided for a credal statement on this point, by the very causes which call for one. All theories rest not only on the necessary implication of divine character in the Bible, but on two specific passages: 2 Tim. iii, 16; «All Scripture is given by the inspiration of God, and is profitable for doctrine» (Revised Version, «Every Scripture inspired of God is also profitable for teaching,» which does not relinquish the claim of inspiration); and 2 Peter i, 21, «Holy men of God spake as they were moved by the Holy Ghost» (Revised essentially the same). The Scriptures were the Old Testament.

The early Church did not generally dwell on theories of inspiration, regarding it as a passive «ecstasy» in which divine truth was communicated, but rarely going on to its effects on the inspired writings or the methods which produced them. Origen, however, the great builder of doctrinal framework, formulated an exact theory of «plenary» or entire inspiration, which preserved the writers from all faults of memory, and left no iota either incorrect or superfluous in Scripture. But others held that all believers were inspired in different degrees; as this made all believers infallible interpreters of the Scriptures, the perilous nature of such a

doctrine led to the opposite one, that there was an inspired official depositary of interpretation as well as an inspired canon of writings. The mediæval schoolmen evolved the theory that there were two kinds of inspiration in the Scriptures: direct, found where moral and doctrinal truths are directly taught; and indirect, in historical passages, whence ethical truths can only be derived by allegorical interpretation.

Regarding inspiration not as a purpose but a method, there are three explanations within the limits of orthodox Christianity: the "plenary" or verbal, the dynamic, and what may be termed the "irradiant" theories. The remaining one, which makes the inspiration only that common to all human beings — who are part of the divine mind — and having no part in any special revelation, is really not a theory of inspiration at all, as it holds that there is none; that all things are parts of the world's evolution, and the sacred writers and the Bible were evolved like the rest, though the latter is the greatest moral product of the world, and to be reverenced in the moral rank as we reverence the greatest writers and thinkers in theirs.

In the early uncritical ages of the Protestant churches, the universal and obvious theory of inspiration was the plenary. The original text of the Bible was dictated word for word by the Holy Spirit, the writers being merely penmen, or media on whom were impressed certain phrases, which must not be varied on peril of distorting the divine revelation. The words of Scripture thus transmitted are God's words, to each reader as if spoken directly to him by the Deity, and no matter to what subject they relate, be it doctrine or history, the origin of man or the duty of man. That there are different styles, corresponding to different writers, means only that God has accommodated his expressions to their natures, for his own utilities. Hence the least particle in the Scriptures is surcharged with meaning, and if anything seems in conflict with science, history, or other portions of the Bible, it arises from corruption of text, bad translation or other change from the actual revealed language. This is the only theory with perfect logical continuity; unhappily it can only be maintained, in face of the increasing body of knowledge of texts, facts and natural ethics, by those willing to abnegate their own right of criticism wholly in favor of their own infallible interpretation. Indeed, the chief argument for the latter is that the divine purpose would be defeated, if its intention in giving the revelation were made null by the misunderstanding of fallible human faculties.

The dynamic theory is the first step outside this bulwark enforced by the impossibility of maintaining verbal inspiration and relegates the divine agency to an indirect function. In place of its dictating the exact phraseology and the precise facts, the writers are so filled with divine force that for all purposes of conveying the essential divine purpose, that of showing the truths of sin and danger and the path of salvation, they are a portion of the divine and incapable of error. Under this theory the writers are left a free hand, according to their own limitations and those of their age, in dealing with narrative facts or their own guesses at them; but are guided explicitly in all matters of faith and morals. In order to be received, the revelation had to be accommodated to the mental conditions of different ages; and men of each received guidance from God to present it so that it was true in relation to them, and remained so for all ages under all conditions. The warrant of the Bible is its incomparable and superhuman system of ethics, and its proof of divine origin is that evident superiority to all human devices.

The "irradiant" theory is a recent one, and a step farther from the old claim of entire divinity. In this view the record as such has no divinity, nor infallibility of any kind. There is a divine revelation, but it acts by generating moral ideas in certain great selected men, and which, once generated, are left to fight their way and take their chance like the other useful ideas of the world, and undergo disbelief and mutilation, with the certainty that according to God's purpose truth will prevail at last. The proof of divinity in Christianity lies in the fact that its moral truths are the greatest in the world, and were original with it.

Another theory is based on evolution, in this both revelation and inspiration are dispensed with, and there is retained only that enlightenment which comes with all development through environment and the laws of variation. In human progress lies the real divine revelation. The Bible is a purely human book, but the greatest of all books, and as such should retain its place as the foundation of our religious structure.

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INSTALLATION, the act of giving possession of an office, rank or order with the accustomed ceremonies, applied especially to the ministerial or pastoral office in the church. The term is now generally used for a formal introduction to any office.

INSTERBURG, Prussia, town in the province of East Prussia, at the confluence of the Angerapp and Inster, 57 miles east of Königsberg. The town church is famed for its wood carvings. Other churches are three Evangelical, one Roman Catholic and a synagogue. Its industrial establishments include iron foundries, flax-spinning mills, machine shops, cement works, leather works, etc. It has a good trade in cereals, flax, vegetables, lumber, etc., and horse-breeding is extensively carried on. The town was founded in the 14th century by the Knights of the Teutonic Order. In 1583 it received civic privileges and thereafter grew

apace. It was besieged by the Swedes in 1679. A fire nearly destroyed it in 1690 and a pestilence decimated its population in 1710. Pop. 31,627. Consult Töws, 'Urkunden zur Geschichte des Hauptamts Insterburg' (Insterburg 1895–97).

INSTINCT. Every organism is born with a number of tendencies to behave in certain specific ways when confronted with stimuli to which they are adequate. These tendencies not only increase in number and complexity as we pass from the protozoa to the primates, but also vary similarly within a single organism. The amœba inherits three simple reactions; tendencies to move toward certain stimuli, to turn away from others and to engulf still others for food. Man, at the other extreme, has innumerable innate dispositions, and they vary in complexity, as, for example, tendencies to cough and to sneeze, to fear and to become angry, to associate with his kind and to think to a conclusion. All these tendencies are instinctive, and instinct may be defined as "the general name for these innate tendencies" (Titchener), or as a "congenital mode of behavior dependent upon inherited dispositions within the lower brain centres" (Morgan), or again as "a combination of congenital responses unfolding serially under appropriate stimulation" (Watson). Despite differences in emphasis and systematic treatment these three definitions are in agreement as regards essentials, and all three ultimately refer instinct to the nervous system. It is a mistake, therefore, to suppose, as is popularly supposed, that instinct is a faculty provided by Providence to direct the actions of animals and opposed to the faculty of reason furnished for the guidance of man. Such a view purports to explain but, in fact, explains nothing, and it overlooks the fact that man probably has more instincts than the lower animals. If, then, an instinct is a tendency which in the final analysis belongs to the nervous system, then it follows that we must go to biology, particularly physiology, for a detailed description. Nevertheless, instinct has also a psychological aspect, instinctive acts are accompanied by mental processes, and some mental patterns have as their physiological correlates certain instinctive tendencies. Much needless controversy has arisen through a confusion of the biological and psychological points of view, and confusion can only be avoided by considering the two aspects separately.

Biology.— The biologists have as yet done little more than to clear the ground for future work; the detailed study of instincts is yet to come. Furthermore, no classification of instincts has thus far found general acceptance. Instinct may, however, be roughly marked off from the physiological reflex on the one hand and from habit on the other. The former, of which the knee-jerk, heart-beat and eye-wink will serve as examples, is as a rule confined to a single group of muscles whereas instinct usually involves the entire organism. Habit is a tendency which is acquired during the lifetime of the organism. We cannot, of course, push these distinctions too far; there is no sharp line of demarkation between reflexes and instincts, and not only are many habits based upon instinctive tendencies but many instincts are not perfected at their first appearance. The results of the experimental investigations may be summarized as follows: (1) Not all instincts make their first appearance at birth; in the vertebrates, at least, new tendencies appear at different stages of growth particularly between birth and puberty. In white rats, for example, the instinctive act of "face washing" does not appear until the 12th day, play about the 15th day and sexual activities about the 65th day; the monkey does not as a rule begin to walk before the third week, to make characteristic vocal sounds before the ninth week and the sexual instincts do not appear until the end of the first year. (2) We have seen that instincts are not always perfected when they make their first appearance. When this is the case, it sometimes happens that the characteristic act of a species may be modified or even completely inhibited by subsequent experience. Baltimore orioles reared in captivity and in isolation developed a song quite different from the usual song of their kind; English sparrows reared with canaries gave up the chirp of the sparrow for the peep of the canary; the tendency of a pike to strike at a minnow was completely inhibited after successively bumping against a glass plate inserted in the aquarium and in front of the minnow. (3) The less selective instincts like rest, sleep and play are extraordinarily persistent although in the human organism they may repeatedly find new forms of expression; others, however, which seem to be conditioned upon the bodily state of the organism as, for example, the various instincts of the mother in caring for her young, may wane and fade out. (4) Yerkes has found that some instincts like savageness, wildness and timidity in rats, and the direction of whirl in the dancing mouse are hereditary traits.

Psychology.—We turn to the psychological aspect of instinct. Here, although even less is definitely known than on the biological side, three problems stand out in bold relief. We have to investigate the mental processes that are present in the instinctive act (the action consciousness), to describe other mental states which are conditioned upon instinctive tendencies, and to work out the relation of instinct to meaningful experience. As regards the first, work on the human organism seems to show that the instinctive is of the same type as the sensori-motor act, i.e., the perception of the object touches off the reaction, there is necessarily no conscious representation of the determination to act or of the action's end. We have no reason to suppose, therefore, that, for instance, the wren is in the least aware of what it is doing or why it is doing it when it builds its nest. This does not mean, however, that, accompanying the instinctive act, there is no psychological experience. On the contrary we may safely assume that even in the lowest forms of animal life some sort of sensory experience releases the disposition and to an extent determines the subsequent course of the action. Secondly, psychologists are agreed that, particularly in the case of the grosser emotions, the emotive is an instinctive consciousness, and the psychology of the emotions is, therefore, in a sense a psychology of instincts. In fear, for example, the vaso-constriction, the rapid heart-beat, the spasmodic

respiration, the glandular secretions are touched off by instinctive tendencies, and the correlated patterns of organic sensations and feelings form the core of the mental experience. Aside from this general statement little is established as regards either a detailed description of the emotions or of their number and variety. It is, perhaps, because of their instinctive basis that psychology has found it difficult to bring the emotive instincts under experimental control. Finally, the more we learn about instinctive tendencies the more apparent it becomes that the situations from which they proceed are meaningful, but we need not suppose that the organism is necessarily aware of the meaning. The chick in the egg feels (we may only guess as to its nature) a vague discomfort, and the complicated reaction by which it makes its egress from the shell is released. How this particular tendency to react thus to this particular situation originated is a question which cannot be answered until biology has given us a satisfactory theory of the origin and transmission of instincts—a task that must await a more detailed description of the nervous correlations involved. Consult Baldwin, J. M., 'Mental Development' (New York 1906); Hobhouse, L. J., 'Mind in Evolution' (London 1901); Jennings, H. S., 'The Behavior of Lower Organisms' (Washington 1904); James, W., 'Principles of Psychology' (New York 1890); McDougall, W., 'Social Psychology' (London 1908); Morgan, C. L., 'Instinct and Experience' (New York 1912); Titchener, E. B., 'Beginner's Psychology' (New York 1915); Watson, J. B., 'Behavior' (New York 1914); Wundt, W., 'Lectures on Human and Animal Psychology' (New York 1901).

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INSTITUTE OF FRANCE, The, official name for a group of learned societies in France, having for object the fostering of some branch in art, literature, science or philosophy. At present it consists of five sections, the official names of which are: (1) L'Académie Française; (2) L'Académie des Inscriptions et Belles Lettres; (3) L'Académie des Beaux Arts; (4) L'Académie des Sciences; (5) L'Académie des Sciences Morales et Politiques. The creation of the Institute of France was decided on by the Convention in the Constitution of the year III (1795); Section 298 of that Constitutional Law reads as follows: "There is, for the Republic, a national Institute entrusted with the care of collecting all discoveries, and furthering the progress of arts and sciences." The Charter of Foundation, however, admitted only three sections: (1) "Sciences Physiques et Mathématiques; (2) Sciences Morales et Politiques; (3) Littérature et Beaux Arts," avoiding the denomination of Academy, which was considered as reactionary by the new-born republic. Among the 144 members of the Institute, 66 belonged to the first section, which, at that time, was deemed the most important of the three. One-third of the members were appointed by a decision of the Directory; these first 48 members chose themselves a new contingent of 48; and finally these 96 elected the third and last contingent, also of 48 members. The Directory granted to each of these an annuity of 1,500 francs ($300) which was then deemed sufficient to keep a man above the poverty line. To-day, although it is no longer deemed sufficient, as every visitor to Paris must know, this annuity has not been raised, although Napoleon wished to increase it to 5,000 francs; in fact, it amounts only to 1,200 francs, as 300 francs are deducted every year in order to create a fund which is redistributed, under the form of *jetons de présence* (attendance fees), to the members who attend the sittings of their respective academies. The Institute of France was introduced to the public in the *Salle des Cariatides*, of the Louvre, which was splendidly decorated for the ceremony, which took place on the 15th *Germinal of the year IV* (4 April 1796) and was attended in great solemnity by the State Ministers, the Diplomatic Corps and a magnificent crowd; from the speeches which were delivered, from the grandiose ceremony of inauguration, "the impression was created," said M. Raymond Poincaré, in his address, on the Commemoration Day of the Centenary of the Institute (in 1895), "that a great thing had been achieved, and public homage was paid to the Unity of Sciences by a rejuvenated nation." In 1805 Napoleon, who, as First Consul, had already given a special costume to the members of the Institute, decided that the latter should have their own palace; the Institute was therefore transferred to the palace which faces the Louvre over the Pont-des-Arts, and which bears the name of Palais de l'Institut. Its library (which must not be mistaken for the Bibliothèque Mazarine, in another portion of the same building), consists of 500,000 volumes. The name Academy which had been suppressed by the convention was revived by Louis XVIII in 1816; and the Académies were restored to their own former charters; since 1870, the five of them meet together every year in a solemn public assembly, on the 25th of October. On that occasion some of the prizes granted by the Institute are delivered to the winners. In its present condition, the Institute has 231 ordinary members (*membres titulaires*) to whom must be added 296 correspondents; some of the latter are foreigners, and we may mention among the Americans who are *Correspondants de l'Institut*: Edward Charles Pickering, George Ellery Hale, William Morris Davis, Albert A. Michelson, Paul Wayland Bartlett, James Mark Baldwin, Charles William Eliot. The most important of all the prizes which are given by the Institute is the Prix Osiris (triennial), which amounts to 100,000 francs. This prize was established by Baron Osiris, "for the purpose of rewarding the most remarkable work in science, or in letters, or in industry and generally in whatever concerns public welfare." The *Prix Osiris* was granted in 1903 to Dr. Roux in consideration of his researches on *serums* and transferred immediately by him to the Institut Pasteur of which he is the director; in 1906 the prize was awarded to M. Albert Sorel in consideration of his historical researches. Many other prizes have been offered to the Institute by rich individuals: the oldest of these liberalities was made as far back as 1819 when Baron de Montyon bequeathed an annuity of 37,000 francs for the purpose of rewarding "the most virtuous actions and the books which may best further the progress of morality." In 1886 the

Château de Chantilly with its very valuable library (Musée Condé), was given to the Institute by the Duc d'Aumale; in 1897 the Château de Langeois, one of the finest types of French architecture, was given by M. Jules Siegfried; in 1906 the private house of M. Thiers, first President of the 3d Republic, was bequeathed by Mlle. Dosne, his niece; in 1900 M. Jean Debrousse bequeathed 1,000,000 francs "to be used by the Institute as it will deem most proper." Many other donations and legacies have been made to the Institute and to each of the five Académies. Every year numerous prizes for hundreds of thousands of francs are distributed to men of letters, artists, men and women in difficult circumstances, etc., so that the Institute acquires further prestige every year. To be "Membre de l'Institute" is a great honor of which Napoleon himself was very proud; the foreign correspondents may be struck off the list when the Institute considers that they have failed in any particular circumstance: the most prominent case of such elimination was that of the German professors who, at the beginning of the European War, tried, in their 'Address to the Civilized World' to justify the invasion of Belgium, etc. Among the German correspondents who were struck off the list, we may mention Herren Vilomowitz-Moellendorf, Dorpfeld, Harnack, de Groot, Karl Robert, Wundt Riehl, Liebermann.

Let us now examine each of the five Académies.

I. The Académie Française (such was the original name), was founded by Cardinal de Richelieu, Minister of Louis XIII, in 1635. A few years before, the poet Antoine Godeau and his cousin Conrart, secretary to the King, used to meet every week at the latter's house which was situated at the corner of Rue Saint Martin and Rue des Vieilles-Etuves, with a few distinguished friends of literary taste. When Richelieu, in 1635, inquired of these gentlemen whether "they would not like to be formed into a company under the authority of the state," they could not but accept such direct invitation. Richelieu understood from the beginning the important part which the new-born Academy could play in the development, unification and purification of the French language; and his ambition, among others, was that French should acquire the same perfection, importance and power of domination as Latin and Greek. As early as 1634, that is to say one year before it was officially constituted the Academy decided to prepare a 'Dictionnaire de la Langue Française'; the first edition of which was published only in 1694. Since that time seven revised editions have been published; the second in 1718, the third in 1740, the fourth in 1762; the fifth, under the convention which had first suppressed it; the sixth and the seventh in 1835 and 1877. The Academy is now preparing the eighth edition. When Richelieu died in 1642, the Academy chose, as patron, Chancelier Séguier, who invited the members to hold their weekly meetings in his own private hotel. But, when Séguier died, the Academy did not seek a patron among state ministers, or great personages who might perhaps become an obstacle to its independence; it applied directly to the king himself, believing, which was right enough, that the king as a patron would remain a stranger to all coteries and petty intrigues which were more or less favored by ministers. In fact under the protection of Louis XIV, during 42 years, the Academy enjoyed great freedom, independence and even privileges such as a right to two invitations at all official festivities at the court, the right of appeal direct to the king without the medium of his state ministers Besides, it was invited by Louis XIV to make its permanent abode in the Louvre, the king's own palace, from which it was removed only in 1793 by the convention. The rooms occupied by the Academy were situated on the ground-floor and are at present part of the French Sculpture Gallery, (Salles du Puget and Salle des Coustou). Toward 1693, when La Bruyère was elected, the Académie Française was composed of a most brilliant Pleiad of writers who greatly cooperated in making the reign of Louis XIV one of the most glorious and in giving to the history of French literature an unparalleled splendor; if indeed Corneille and Colbert were dead there were still Bossuet, Fléchier, Fénelon, Racine, La Fontaine, Boileau, Perrault, Fontenelle. The next generation of Academicians was not so brilliant: the "Grande Seigneurs," great dignitaries and other personages of high station, finally considered that certain seats in the Academy belonged to them or their caste as a sort of birthday right: three dukes de Coislin, for instance, were Academicians; even to-day the "parti des ducs" still exists under the "Coupole"; it means that the old aristocracy is always represented in that ancient institution, but it is right to say that members of the nobility are elected as much on account of their literary achievements as of their aristocratic origin. During the 18th century, however, some men of great literary fame belonged to the Academy; among them we must mention d'Alembert who wrote the celebrated preface to the 'Encyclopédie'; he was one of the most appreciated men in Europe. Frederick II, King of Prussia, wanted him to live in Berlin and, for that purpose, offered him the presidency of his own academy; Catherine, Empress of Russia, wanted him to educate her son; fortunately he refused these kingly and imperial offers in order to devote himself to the great cause of emancipation which was more or less outlined in the 'Encyclopédie' and which was to triumph in 1789 and the following revolutions. Voltaire, Duclos, Condorcet were also members of the Academy. During the second half of the 18th century the whole of Europe turned its attentioon to that Institution; all the monarchs and princes who came to Paris (the King of Denmark, the King of Sweden, the King of Prussia, the Imperial Russian Crown Prince, etc.), made a point to attend at least one of its meetings. On 28 June 1917, at the reception of M. Alfred Capus, General Pershing was solemnly entertained at the Palais de l'Institut. Although the great French Revolution had been prepared by some of the most distinguished members of the Academy, the latter was finally considered by the convention as a reactionary institution smacking too much of the *ancien régime* and ancient prerogatives. It was suppressed in 1793. It revived when the Institut de France was created in 1795, under another name as the Classe de Langue et Littérature Françaises. In 1816, however, Louis XVIII restored it to its former name of

Académie Française which has been retained ever since. About the same time (1819), Baron de Montyon left by testament to the Academy an annuity of 37,000 francs which is distributed every year in the form of two prizes (*prix Montyon destiné aux ouvrages les plue utiles aux mœurs;* and *prix de vertu, fondation Montyon*). Since that time many prizes have been instituted by the Academy, thanks to the numerous gifts, donations and legacies which have steadily increased its financial power. The following list of prizes, although incomplete, distributed by the Academy, will give an idea of its social and literary importance:

Prize	Francs	
Montyon	37,000	yearly
Souriau	1,000	"
Marie Lasne	1,800	"
de Sussy	8,000	"
Camille Favre	13,500	"
Lelevain	1,500	"
Emile Robin	1,000	"
Lange	6,500	"
Buisson	3,500	"
Louise Varat-Larousse	4,500	"
Savourat-Thénard	5,500	"
Pérou	1,000	"
Bausa-Gessiomme	2,500	triennial
Agenogiu	1,900	yearly
Rigot	3,200	"
Jules Favre	1,000	"
Passemard	1,000	"
Anonymous	1,000	"
Anonymous	4,500	biennial
Peyrard-Beaumanoir	3,000	yearly
Broquette-Gonin	12,000	"
Alexandre Broquette-Gonin	8,000	"
Tremblay	1,000	biennial
Bigot	6,000	"
Baron and Baronne Léopold Davillier	6,000	yearly
Argut	4,000	"
Cavelan	6,000	"

All these prizes are generally awarded, according to the wishes of their founders, to such persons, male or female, as live an exceptionally virtuous and laborious life, and are considered as having reached a high level of family, social or moral perfection. Nearly all prizes are awarded annually: the following conditions are required of the competitors; the action eventually to be rewarded must have been continued into the last two previous years. A detailed memorandum, with approved certificates, signed by local authorities, and giving full information concerning the competitor's eventual right to a prize, must be sent to the *Chef du Secrétariat de l'Institut.* Such memorandum must not be signed nor sent by the competitor himself. The latter's name, Christian name and place of residence must be placed at the head of the memorandum. The number of academicians is 40. Whenever one of the seats becomes vacant, the Academy elects another member to take the place of the deceased. The new member is formally admitted into the "illustre compagnie" at a solemn and pompous meeting; on such occasion each "immortel" wears his green uniform, cocked hat and sword; there is a restricted number of seats for the public; in fact it is very difficult to get admission; as a rule the audience is of an extremely select and aristocratic character. The reception consists essentially in the exchange of two speeches, rather lengthy, between one member of the academy and the "récipiendaire," the latter devoting his remarks to the virtues, talents and achievements of his predecessor, whilst in his own *discours*, the other party never forgets to impress upon the new member that the academy has secured immortality for his name, if not his literary works; in a harmless, humorous and half innocent manner, he unloads upon the newcomer a number of appropriate remarks in which the audience takes a great delight. Perhaps one of the most interesting "*discours académiques*" in that respect, was the one delivered by M. Ernest Lavisse at the reception of Monsieur Raymond Poincaré, the President of the French Republic (in 1909).

The following is the list of the living members of the Academy in order of seniority:

Othenin P. de Cléron, Comte d'Haussonville	Alexandre Félix Joseph Ribot
Charles Louis de Saulces de Freycinet	Maurice Barrès
Louis Marie Julien Viaud (Pierre Loti)	Jean Richepin
Ernest Lavisse	Raymond Poincaré
Paul Bourget	Eugène Brieux
Jacques Anatole Thibault (Anatole France)	Jean Aicard
Gabriel Hanotaux	René Doumic
Henri Léon Emile Lavedan	Marcel Prévost
Paul Deschanel	Monseigneur Duchesne
Edmond Rostand	Henri de Régnier
Prédéric Masson	Denys Cochin
René Basin	Hubert Lyautey
Etienne Lamy	Emile Boutroux
	Alfred Capus
	Pierre de la Gorce
	Henri Bergson

II. The Académie des Inscriptions et Belles-Lettres was created by Colbert in 1663. It was known first under the name of La Petite Académie, then of L'Académie des Médailles, then of L'Académie Royale des Inscriptions et Médailles in 1701, and finally under its present name since 1716. It was temporarily suppressed by the Revolution and revived when the Institut de France was created in 1795. The Académie des Inscriptions is interested mainly in historical studies and investigations concerning numismatics, all sorts of ancient documents and inscriptions, living and dead languages. Every year it distributes many prizes to the students and writers whose historical researches appear to be useful. The prix Gobert (10,000 francs, yearly), for instance, is intended to reward "the most learned and exhaustive research concerning French history." More than 80,000 francs are offered in prizes every year by the Academy for similar works and researches.

III. The Académie des Sciences was also created by Colbert under Louis XIV, in 1667. The meetings were held first in Colbert's library and, from 1699 to 1793, in the Louvre. It consists of 78 members; like the Académie Française and the Académie des Inscriptions et Belles Lettres, it was temporarily suppressed by the Convention and revived when the Institut was created in 1795. It is divided into the following sections: geography and navigation, geometry, statistics, mechanics, astronomy, botanics, medicine and surgery. The Academy of Science offers many annual prizes ranging between 500 to 10,000 francs. One prize (Prix Pierre Guzman) of 100,000 francs will be awarded to any one who will discover the means of communicating with a star other than the planet Mars, that is to say, who will make a sign to a star and receive an answer to that sign. Another prize of 100,000 francs will be awarded to the person who will discover the means of curing Asiatic cholera.

IV. L'Académie des Beaux-Arts was created in 1648 by a famous artist, Charles Le Brun, under the patronage of M. de Charmois, an influential courtier, under the name of

Académie Royale de Peinture et de Sculpture. The 12 initial members of that company opened a school (École du Nu); later on, in 1656, the king invited them to hold their meetings in the Louvre where they remained until their academy was temporarily suppressed by the Convention. In 1666 the Académie de France à Rome, a school where French artists completed their studies, was created by the Académie Royale de Peinture et de Sculpture with the co-operation of Colbert. That school is located at present in the Villa Médicis; the École des Beaux-Arts, in Paris, is under the control of the Académie des Beaux-Arts. There are 51 members in the Academy of Fine Arts which consists itself of the following sections: painting, sculpture, engraving, music. Numerous prizes are awarded every year to artists, students, etc. . . . in order to encourage the progress of fine arts and, at the same time, to guide public opinion which is sometimes slow in recognizing the merits of artists.

V. L'Académie des Sciences Morales et Politiques was created under the name of Classe des Sciences Morales et Politiques in 1795, as one of the sections of the Institute. It was suppressed quietly in 1803 by Napoleon who did not give any reason for his decision. It may be that the inquisitive spirit and criticisms of that Institution on political matters, social and religious controversies did not please a despotic sovereign; nobody, however, has been able to discover any proper justification of such sudden suppression. It was restored under its present name by Louis-Philippe, in 1832, when it joined the four other academies in the Palais de l'Institut. It is divided into five sections: (1) Philosophy, (2) Morals, (3) Legislation and Jurisprudence, (4) Political Economy, Statistics and Finance, (6) General and Philosophic History. The number of Academicians is 51. Some important prizes are awarded every year, some of them amounting to 10,000, 12,000 and 15,000 francs; the prix François Joseph Audiffred (15,000 francs), was awarded, in 1917, to Cardinal Mercier, the great unconquerable Belgian prelate who has deserved universal admiration. The list of these prizes increases steadily from year to year, thanks to the generosity of rich individuals. Anybody interested in the prizes awarded by the Institut de France may have full particulars regarding the conditions, the subjects proposed, etc., by applying to the Secrétaire Perpétuel of any one of the five academies. The Institute publishes also every year a booklet giving the names of all the members and correspondences of each academy, under the title of 'Annuaire de l'Institut.'

MARC DE VALETTE.

INSTITUTE OF SOCIAL SERVICE, American. See SOCIAL SERVICE.

INSTITUTES OF THE CHRISTIAN RELIGION, The ('Christianæ Religionis Institutio'), by which John Calvin laid the foundations of Calvinism, stands unique among books that have had immediate, deep, wide, and lasting influence on Christian thought and life not alone for the author's youth, the comparative brevity of the theological studies that preceded it, and the speed at which it was completed, but also for the fulness with which the system it presents was elaborated at the work's first appearance in 1536. For though revised and extended, more logically and inclusively presented, in the edition of 1539, still further revised in 1543 and 1550, and reaching its final form only in 1559, it shows throughout no sign of change of position, still less of retraction. Begun in 1534 when Calvin was barely 25, the book was practically completed when in August, 1535, Calvin addressed the remarkable letter to King Francis I, with which it opens. As this letter shows, the Institutes were composed, or at least completed, to meet a present necessity, to correct an aspersion on his fellow reformers. The French king, wishing to suppress the Reformation at home yet unwilling to alienate the reforming princes of Germany, had sought to confound the teachings of the French reformers with the attacks of Anabaptists on civil authority. "My reasons for publishing the Institutes," Calvin wrote in 1557, "were first that I might vindicate from unjust affront my brethren whose death was precious in the sight of the Lord, and next that some sorrow and anxiety should move foreign people, since the same sufferings threaten many." Therefore he wrote in Latin, but he proceeded immediately to translate his work into French, and in both forms it gained quickly wide circulation.

"The hinges on which our controversy turns," says Calvin in his letter to the king, "are that the Church may exist without any apparent form" and that its marks are "pure preaching of the word of God and rightful administration of the sacraments." If such preaching bring disorder, the blame is not with it but with Satan. The 'Institutes,' in this first form, follow the traditional arrangement, observed also in Luther's short catechism of 1529, and fall into six chapters. The first three, dealing with Law, Faith, and Prayer, and, in the main, the fourth, treating of the sacraments of Baptism and the Lord's Supper, are expository. The last two were of necessity more controversial, for they dealt with "False Sacraments," namely Confirmation, Penance, Unction, Orders, and Matrimony, and with Christian Liberty, Ecclesiastical Power, and Civil Administration. The controversial tone, even here, is, however, less pronounced than in later revisions, and what are commonly regarded as the distinctive features of Calvinism are less emphasized.

The 'Institutes' in this first form were not merely a logical and felicitous exposition of Reformation doctrine; they proved the inspiration to a new form of Christian life. Their debt to Luther in the treatment of Faith and Sacraments, to Martin Bucer in what is said of Divine Will and Predestination, and to the later scholastics for teaching involving unsuspected implications of freedom in the relation of Church and State, has been clearly traced. Yet the 'Institutes' were justly felt to be as a new voice, and before the year was out there was demand for a second edition. This came in 1539, amplifying especially the treatment of the Fall of Man, of Election, and of Reprobation, as well as that of the Authority of Scripture. It showed also a more irenic temper toward Luther in the section on the Lord's Supper. The edition of 1559, claiming to be

"almost a new work" is in fact a complete recasting of the old 'Institutes' into four books and 80 chapters, on the basis of the Apostles' Creed. In this form the work was translated into French and Dutch in 1560, into English in 1561, into German in 1572, into Spanish in 1597. Seven other editions and four abridgments appeared in English before the end of the 16th century. A judicious summary of the teachings of the 'Institutes' is to be found in W. Walker's 'John Calvin,' pp. 409–429. No book of its century showed such power to spread ideas and to unify the strivings for reform. That cardinal period in Christian development found in this book the most logical, clear, characteristic presentation of what reformers prized as truth, and, though its teachings are nowhere held to-day in their fulness, the place of the 'Institutes' as a Christian classic is secure.

Very important in their apparently unrealized implications were the teachings of the 'Institutes' on civil government. They counted it the function of an ideal state to see that no "offenses against religion break out or be disseminated." It was, indeed, a duty to submit to rulers negligent in this regard; but "if they command anything against God, let us not," says Calvin, "pay the least regard to it nor be moved by all the dignity which they possess as civil magistrates" ('Institutes,' IV, xx, 32). With the example of church officers responsible to the congregations they served, such teaching could not fail to stimulate the movement toward individual liberty and democratic freedom.

Changes from the teaching of the 'Institutes' among those who most cherish Calvin's memory are notable in the matter of church discipline and in regard to the duty of civic rulers to guard the purity of the church. Changes are seen also in the doctrine of the Scripture, of election, reprobation and human depravity. This is natural. The appeal of the 'Institutes' was to the intellect, and these very changes are in large part the result of the vigorous thinking which the 'Institutes' demanded and of which they were so eminent an exemplar. The standard edition of the 'Institutio' is in Calvin's Works, edited by Baum, Cunitz and others (59 vols., Brunswick, 1863–1900); the last volume has a full bibliography. Translations by H. Beveridge (3 vols., Edinburgh, 1845–46) and others. See Rayburn, H. Y., 'John Calvin, his Life and Works' (New York 1914); Penning, L., 'Life and Times of John Calvin' (New York 1912); Walker, W., 'John Calvin' (New York 1906).

BENJAMIN W. WELLS.

INSTITUTES OF ORATORY, The ('De institutione oratoria'), of Quintilian, composed after his retirement from active life, took more than two years to write (89–91), but was withheld for a few years until the urging of his friends compelled its publication, the circumstances of which are given in a foreword addressed to his publisher, the bookseller Trypho. The work itself, consisting of 12 books and dealing with the whole education of the future orator, was dedicated to Vitorius Marcellus (the same to whom Statius addressed the fourth book of his 'Silvae'), whose son Geta showed talent. Quintilian probably also had in mind his own elder son. He repeatedly attacks the ordinary handbooks of rhetoric, while his own theory is based on his own experience and the best views of different authorities, especially Dionysius of Halicarnassus, Cæcilius, Chrysippus, Cicero (upon whom his exposition is mainly founded and from whom he seldom differs and then only with reluctance), Cornificius and Celsus. Quintilian insists that the orator must be of good moral character as well as versed in rhetorical accomplishments. His illustrations are drawn mainly from the classical writers and he attacks the style of his own day, at the same time warning the pupils also against the early writers. Especially interesting is the 10th book, which treats of literary criticism as regards the Latin and Greek prose writers and poets useful to the orator. The chief manuscripts of the 'Institutiones' date from the 10th and 11th centuries. A large and annotated edition is that of G. L. Spalding (Vols. I–IV, Leipzig 1798–1816), C. G. Zumpt (Vol. V, 1829) and E. Bonnell (Vol. VI, containing lexicon and indices, 1834), but the pincipal edition is that of C. Halm (Leipzig 1868), revised by F. Meister (Prague 1886–87). Book X has been separately edited by J. E. B. Mayor (pt. I, London 1872), E. Bonnell and F. Meister (5th ed., Berlin 1882), G. T. A. Krüger and G. Krüger (3d ed., Leipzig 1888) and W. Peterson (Oxford 1891). The 'Institutiones' have been translated several times into several of the continental languages and an English translation by J. S. Watson (2 vols., London 1902–03), with notes based on Spalding, appears in the 'Bohn Classical Library'.

HERBERT F. WRIGHT.

INSTITUTIONAL CARE OF THE INSANE. See INSANE, INSTITUTIONAL CARE OF.

INSTITUTIONAL CHURCH, a noncredal organization of Christians, to supplement the regular church methods and ministrations — preaching, prayer-meetings, Sunday school, and pastoral visitations — by helpful social work in the community. The moving spirit is the same as in the Y. M. C. A., University Settlement, Salvation Army, Rescue Missions, Christian Endeavor societies, etc.; but "with the emphasis on Church, not Institution." The prime object is to reannex to the church the functions which other bodies have been compelled to fill by its neglect of its duty; and strengthen it by gathering potential Christian elements which under the old system do not come to it, as well as by combining in itself all the claims to public gratitude and interest now shared between the purely ecclesiastical and the purely social institutions, or the halfway houses like the Y. M. C. A. It differs from the latter in not merely furnishing a religious atmosphere which may lead to church membership, but enrolling members at once in a real church of Christian work by absorbing the secular features of the other; in a word, to do, without vows or uniforms, what the Catholic Church has always done with its charitable functions — make them an integral portion of the church organization. Hence, it is not by itself a church in the sense of the Roman Catholic or the Methodist Church, but in a broad sense a description of any church which adds educational or social work; in general use, a title of any which throws into this work its predominant vitality. Free pews are an es-

sential accompaniment, as the social aristocracy fostered by rented pews contradicts the basal democratic principle of institutional work; hence it is sometimes called Free Church, but preferably Open Church. The present name originated with President Tucker of Dartmouth College, who applied it to Berkeley Temple, Boston.

The movement started chiefly with the High Church element in England, modeled on the Catholic idea; it flourished for two generations in that country before reaching the United States, about 1880. Now a large number of churches — Episcopal, Congregational and Baptist in the forefront, but also Methodist, Presbyterian, Unitarian — have adopted the idea with increasing vigor, besides the work of this class always performed by the brotherhoods and sisterhoods of the Roman Catholic Church. One of the earliest of these was Plymouth Church of Indianapolis, inspired by the memory of Mr. Beecher. Notable among others are the Saint Bartholomew, Saint George, Saint Paul and Judson Memorial of New York, and the Tabernacle of Jersey City; Berkeley Temple, Parker Memorial, and Ruggles Street Baptist of Boston; Grace and Bethany of Philadelphia; Ninth Street of Cincinnati, Pilgrim of Cleveland; Plymouth Tabernacle of Detroit; People's of Saint Paul; and the Denver Tabernacle. In 1894 the Open and Institutional Church League was organized in New York; it held several conventions in Eastern cities (1895–1901), and for three years published the 'Open Church' as its organ, but has practically lapsed, being merged in the 'National Federation of Churches and Christian Workers.' The total of its work, however, is not shown by its nominal membership; the same spirit has infected outside churches, and their methods are being more and more adopted as a general basis of work.

The platform of the League stated that it aimed to save all men by "abolishing, so far as possible, the distinction between the religious and the secular"; by "open church doors for every day and all the day, free seats, a plurality of Christian workers, the personal activity of all church members, a ministry to all the community through educational, reformatory and philanthropic channels, to the end that men may be won to Christ and his service, that the Church may be brought back to the simplicity and comprehensiveness of its primitive life." It is not correct to say, as is often done, that its methods are purely secular: its *additional* methods beyond the regular religious ones are so, for the very reason it exists. These involve a thorough organization for social and philanthropic work; but the religious features are sedulously conserved and carefully fitted to the work, the spirit of worship being cherished and made the centre of inspiration. The service generally ends in the communion; there is congregational singing of both hymns and chants, led by a highly trained choir, and often responsive readings; the whole with the sermon are intended to be brief, varied, and attractive. Sunday schools are carefully attended to; prayer meetings given new features; in summer there are open-air meetings; and other Christian associations, endeavor societies, brotherhoods, etc., are encouraged. The officers and workers of the church are given active special duties, such as pastoral visiting, reception and welcome of strangers, canvassing for the various activities of the church; and there are not only sub-pastors, but deaconesses, sisters and nurses. The purely secular side embraces all departments of culture, physical, intellectual and moral, as well as direct charities. Morally, the church work above should be sufficient. The charitable departments include not only direct aid to the poor, but wood-yards, employment bureaus, etc.; personal endeavor to provide employment for those willing to work; dispensaries, hospitals and crêches; and encouragement to thrift by savings funds. Special buildings are often erected.

That the movement is liable to perversions is admitted; such is the case with every institution. Secularization is one; but unless it can be faced, the churches cannot influence or draw in those outside them, for the simple reason that the latter cannot be brought within hearing. Sensationalism, to draw in hearers to be benefited, is a graver one, and ill-judged; as one of its chief workers puts it, "a camp-stool congregation neither pays nor repents," and a lasting work must be content with slower processes. Consult Burr, A. R., 'Russell H. Conwell, Founder of Institutional Church in America' (Philadelphia 1905); Forbes, J., 'Social Ideas of a Free Church' (Boston 1913); Thwing, C. F., 'The Working Church' (New York 1913).

INSTITUTO HISTORICO E GEOGRAPHICO BRAZILEIRO (Brazilian Historical and Geographical Institution), a Brazilian society devoted to the advancement of historical and geographical knowledge, founded at Rio de Janeiro in 1839. Under its auspices and with its aid many historic documents relating to the early history of Brazil have been printed and thus made available to historical students throughout the world. The society publishes many such documents, also accounts of geographical explorations, etc., in its periodical *A Revista Trimensal.*

INSTRUMENT, *in law,* a written document evidencing an agreement or acknowledging a claim, as a deed, grant or will. The term has been held to mean also, in its widest sense, any written document, as a statute or record, but scarcely to apply to accounts, memoranda, or ordinary letters.

INSTRUMENT OF GOVERNMENT, the written constitution under which Oliver Cromwell governed Great Britain and Ireland from 16 Dec. 1653 to May 1657. It consisted of 42 articles, and vested the legislative power in the hands of "one person and the people assembled in parliament." The executive power was placed in the hands of Cromwell as Lord Protector of the Commonwealth; his office was made elective and he was to be assisted as executive by a council of state of from 13 to 21 members. Councilors were appointed for life. A new parliament was to be called every third year, and a parliament could not be dissolved in less than five months except at its own request. There were 460 members in the single chamber — 400 for England and Wales and 30 each for Ireland and Scotland. The distribution of seats was altered. A property qualification of £200 was placed on voters.

Roman Catholics and those who had opposed parliament during the Rebellion were disfranchised. This constitution contained several elements of weakness and its downfall was assured as soon as it dared assert its independence of or opposed the Lord Protector. Consult Gardiner, 'Constitutional Documents' (Oxford 1889; and Jenks, 'Constitutional Experiments' (London 1891).

INSTRUMENTAL MUSIC. See MUSIC; MUSICAL INSTRUMENTALS; ORCHESTRAL MUSIC.

INSTRUMENTALISM, in philosophy, a system, akin to pragmatism, according to which thought is considered an organic function, the object of which is to maintain the even tenor of experience, restoring the latter when it is interrupted or confronted by a special situation. See EPISTEMOLOGY; PRAGMATISM.

INSTRUMENTATION, in music, the arranging of music for a combined number of instruments. The nature and character of the musical ideas must determine whether the instrumentation shall be simple or artistic, and perhaps complex; the latter being the case when some of the instruments take a more prominent part than others. For both purposes, a thorough knowledge of every instrument in the orchestra is absolutely necessary, as without this instrumentation becomes only a deafening mass of sounds. The stringed instruments, from their nature, in most cases, form the principal parts of a score, around which the other instruments move, without depriving them of their importance. The wind instruments represent, more or less, a subordinate chorus, which may again be divided into two kinds, viz., the wood instrument and the brass, which, with the stringed instruments, give three essentially different choral effects, that may be mixed together in endless variety. A knowledge of the art of instrumentation is acquired only by great experience; at the same time much may be learned by consulting the best works on the subject such as Sundelin, 'Die Instrumentirung für das Orchestra'; Berlioz, 'Traité d' Instrumentation'; Gassner, 'Partiturkenntniss.'

INSTRUMENTS, Engineering. See ENGINEERING INSTRUMENTS.

INSTRUMENTS, Musical. See MUSICAL INSTRUMENTS.

INSUBRES, a Celtic people of northern Italy. In the 4th century B.C. they settled in the region between the Alps and the Apennines. They were frequently at war with the Romans after 222 B.C., and in 194 their capital Mediolanum (Milan) was taken and they were finally brought under the yoke of Rome. Consult Holder, A., 'Altkeltischer Sprachschatz' (Vol. II, 1904).

INSULAR CASES, a series of legislative problems created by the "accretion" to the United States of insular possessions following the Spanish-American War in 1898. They arose over President McKinley's recommendation in his message on the convening of the 56th Congress, 3 Dec. 1899, that "legislation should be enacted establishing a civil government in Porto Rico," and involved the status of the citizens of our insular possessions and the constitutionality of an intra-national revenue tax. The Foraker Act, 11 April 1900, defined the relation of the island to the United States, by placing it on a status outside of the Constitution and also outlined a scheme for the government of dependencies that obligated the nation to a new and united policy. This gave rise to the Insular Cases which debated the question of the right to demand duty for commercial articles imported into the United States from Porto Rico. On appeal the Supreme Court decided that the insular possessions were obtained under the clause regulating the making of treaties, and "that the power to acquire territory by treaty implies not only the power to govern such territory, but to prescribe upon what terms the United States will receive its inhabitants, and what their status shall be." See PORTO RICO; CUBA; HAWAII; PHILIPPINE ISLANDS.

INSULATION, non-vibrating or non-conducting material designed to cut off or check the spread of some form of vibration, as heat, sound, electricity, etc., also the process or act of surrounding a body with such non-conductors. The term is sometimes extended to cover insulating material. For shutting out sounds and for keeping in heat, a closed air-space is a simple and effective medium. It is made use of in house-walls, thermos bottles and in refrigerating appliances. For insulating a boiler asbestos or mineral wool is commonly employed, because it will bear the heat. To resist the passage of electricity, glass, shellac, resins, sulphur, ebonite, paper, lead, gutta-percha, silk and baked wood are notable insulating materials. To prevent the lateral passage of electricity from one wire coil to another the wires are usually covered with silk and shellac. Insulators on telegraph poles, to which the wires are attached, are usually made of porcelain, glass or stoneware. Underground telegraph wires are usually of copper, insulated by means of a coating of some composition of gutta-percha and protected by tape or iron wire, metal tubes or wooden troughs filled with bitumen. See ELECTRICITY, *Conductors and Insulators.*

INSURANCE, a contract by which one party, for a stipulated consideration, undertakes to indemnify or compensate another party against loss by certain specified risks. The party undertaking to make the indemnity is usually called the insurer or underwriter, the other the insured or assured; the agreed consideration is termed the premium; the written contract, a policy; the events or causes of loss insured against, risks of perils; and the thing insured or the subject to be protected, the insurable interest. Marine insurance relates to property and risks at sea; insurance of property on shore against fire is called fire insurance; life insurance, in its widest sense, is a contract entered into by the insurer to pay a certain benefit contingent upon the duration of one or more lives. Besides these classes of insurance there are many others; the traveler may insure himself against loss entailed from damage by rail or sea; the farmer from the inroads of disease among his live stock; the employer from the fraud of a dishonest cashier, etc.

The practice of marine insurance seems to have long preceded insurances against fire and upon lives. It is impossible to state the precise period of its introduction, but it is probable that it dates from about the beginning of the 15th

century; though it is contended, on the authority of certain ancient writers, that traces of this form of insurance are to be found among the Romans. Some Anglo-Saxon guilds insured their members against loss from fire, water, robbery, etc. Commercial insurance, however, seems to have originated in Flanders about 1300, although priority is claimed for both Italy and Spain. It is probable that insurance was introduced into England by the Lombards early in the 16th century, but few court cases pertaining to it are found till the middle of the 18th century.

In Great Britain fire insurance has been practised for over two centuries, but on the Continent its introduction dates considerably later. The history of life insurance, as well as that of various other forms now in practice belongs to a still later time. For the history and development of the principal insurance systems in America, see ACCIDENT INSURANCE; AUTOMOBILE INSURANCE; BURGLARY INSURANCE; COMMERCIAL LIFE INSURANCE; GROUP INSURANCE; HEALTH INSURANCE; INSURANCE, INDUSTRIAL; INSURANCE, LIFE; INSURANCE, LIFE, STATISTICS; INSURANCE, MARINE; INSURANCE, SCIENCE AND ECONOMICS OF; INSURANCE LAW; INSURANCE SUPERVISION; INSURANCE FRATERNAL; OLD AGE INSURANCE AND PENSIONS; SOCIAL INSURANCE; WORKMEN'S COMPENSATION, etc.

INSURANCE, Credit. This is a contract issued to jobbers, manufacturers and wholesale dealers guaranteeing indemnity for losses sustained through insolvent debtors in excess of their normal trade loss as shown by the insured's records or as agreed with the insurer. Such a policy commonly runs from year to year and covers only such sales of merchandise as are shipped and delivered.

Credit insurance was first authorized by statute in New York in 1886, in New Jersey in 1889 and in other States shortly after these dates. The first company to undertake such risks in America was organized in New Jersey in 1888 under the title United States Credit System Insurance Company. Other special corporations of this character followed, in Louisiana in 1891, in New York in 1892 and in Minnesota in 1893. The field being new, these earlier ventures suffered from lack of experience on which to base the business and all but one came to an end within a few years. The general casualty corporations, already assuming varied lines of this character, were shortly qualified to assume credit risks, but the field has been left so far to a few companies which perform an increasingly useful function for the greatly expanded business credit system of the present time. The business is handled almost entirely by one New York company and the United States branches of two foreign companies.

The plan of operation for credit insurance was devised by the actuary of the first company organized and has been followed by its successors, experience affecting mainly the matter of rates and the selection of risks.

The basis of the whole scheme of this class of insurance is the generally accepted mercantile ratings, as evidencing the financial strength and reliability of the debtors concerned. The insurer, however, undertakes to give indemnity for only the excess of credit losses beyond the ordinary percentage experienced by the insured's business, not including single sales or transactions but the average loss sustained during not less than one year.

This insurance is not only confined to risks on parties having mercantile ratings, but the amount of sales covered is limited to a percentage of a debtor's lowest capital rating as given by mercantile agencies. A policy may be had to apply to debtors of the first and second grade commercial ratings, or for a larger premium the policy will cover in addition parties with lower ratings.

Credit policies state minutely the conditions of the contract and define liberally when a condition of solvency exists and in what manner a claim shall be set up. Reckless management combined with inexperience to demoralize the business during the earlier years, and technical defenses were often resorted to as an offset to claims. In later years credit insurance became settled on stable and conservative lines and has prospered. The passage of a general bankruptcy act by the federal government in 1898 materially aided in placing credit insurance business on solid ground.

The table here given sums up the results of all this class of business transacted in America as far as reported in the best authorities, showing the early period of uncertainty separately, then the five-year periods to the end of 1916, and lastly the year 1917 by itself.

CREDIT INSURANCE IN AMERICA.

	Premiums	Losses	Ratio per cent
1889–1896	$2,297,917	$1,174,491	51.1
1897–1901	$2,543,296	$656,259	25.8
1902–1906	9,867,731	4,258,707	43.1
1907–1911	9,835,400	6,446,803	65.5
1912–1916	7,405,227	4,084,458	51.1
Total, 20 years	$29,651,654	$15,446,227	52.1
1912	$1,611,352	$1,195,839	74.2
1913	1,496,826	923,292	51.7
1914	1,487,506	732,139	49.2
1915	1,395,713	939,765	67.3
1916	1,413,830	293,423	20.7
1917	$1,665,915	$96,676	5.8

The table shows that, when trade conditions were normal, premiums were sufficient to pay losses and leave an ample margin for expenses and profits, but that during times of stringency and emergency, as in 1907 and 1914, greatly increased losses followed. This dangerous uncertainty can be met only by an ample surplus accumulated out of the years of plenty for the years of leanness that are sure to recur, whether caused by crop failure, financial disturbance, contagion, war or abrupt economic changes, as it is precisely against such surprise contingencies that credit insurance must demonstrate its highest utility.

From the statement of an official long experienced in this line of protection, the benefits of credit insurance may be summarized as follows:

It serves as a reserve to the insured's capital, equal to face of the policy, to offset unexpected losses.

It serves as collateral security to accounts against misfortunes that may befall even preferred customers.

It protects profits against unexpected and unavoidable losses.

Joined with the other forms of insurance it completes the chain of commercial protection.

It is readily seen that the function of credit insurance is that of all insurance — not to relieve the creditor of responsibility for his accounts or to invite debtors to repudiate their honest indebtedness, but to provide against those uncertain and unforeseeable events which commercially embarrass the latter and jeopardize the enterprise of the former. By a properly conducted credit insurance such losses are widely distributed among creditors in similar business circumstances, so that no one is seriously burdened.

CHARLES MAAR,
Insurance Department, State of New York.

INSURANCE, Fraternal. This term applies to a large class of societies that has come into existence in America since the Civil War, whose primary object is to provide a substantial death benefit for the families or dependents of the members on the co-operative plan. These orders are to be distinguished from the older class of secret societies, comprising the Masons, Odd Fellows and Foresters, which originated for the most part in Europe and have primarily social and benevolent objects; and also from another large class of societies that has come into being during the past half century or more and which combine good-fellowship with stipulated sick and funeral benefits, although some of the first-named orders afford sick or other benefits, in one way or another, in addition to death benefits.

It is well known that all fraternal societies, as known in America and now numbering many hundreds, have distinctly moral and religious foundations, are educational and tend to develop character, good citizenship and the spirit of co-operation and mutual helpfulness. The Masonic bodies afford charitable relief generously where the need is made evident, but in other fraternities the kind and measure of the benefits are stipulated and become the right of members on the basis of their dues or assessments and good standing, irrespective of a necessitous condition.

History.— Mutual benefit societies for one object or another are found back as far as the dawn of history. Whatever was necessary or desirable to people in common might be secured by co-operation when the chances of life or the hazards of death rendered the individual helpless. Burial societies were common among the Greeks and Romans, because ceremonial sepulture was indispensable to the repose of the spirit in the land of shadows — the underworld. Among the Teutonic nations, guilds flourished not only for relief against misfortune but for co-operation and protection in daily affairs.

From its earliest rise in Europe the Christian Church was a centre of charitable relief to all whom its benevolent activities could reach. Not only the teaching of its founder, but its own hard early experiences, emphasized charity as the highest of the graces of human character. In Great Britain the system of Church relief was swept away in the general seizure of endowments under the reformation enforced by Henry VIII and in its place under Elizabeth was substituted a system of public relief by poor-rates which has continued with changes to the present time. The old guild spirit, however, came to the surface again during the reign of Charles I, although the guilds had gradually fallen into decay during and after the Elizabethan period. The result was the rise of the English friendly societies for co-operation among people in moderate circumstances who were not satisfied to fall back upon the tender mercies of the poor-rates but endeavored in a self-respecting way to forefend the ills of life and the mischances of affairs by provisions for sharing the hazards among themselves — a principle that is at the bottom of all modern insurance.

Little or no historic connection is apparent between the guilds or friendly societies of Great Britain and the fraternal beneficiary orders of America. The latter clearly took their rise out of the new social and co-operative spirit that was developed by the Civil War, which drew together for the first time on this continent millions of people in a vast undertaking, and by the very necessities of the task drew forth and trained their faculties for joint action to a degree there had not been occasion for before. The pioneer period of America called for the individual hardihood and personal self-reliance that subdued a broad continent and carried settlements from coast to coast. The Civil War indicated an excess of individualism, or at least the approach of a new era which called for an abundant measure of unselfish social co-operation to save the nation from futile division and the continent from antagonistic civilizations.

Between the time of the Revolution and the Civil War such fraternities as the Odd Fellows and the Ancient Order of Foresters and the Ancient Order of Hibernians had been transplanted to America from Great Britain, and certain native societies, like the Tammany Society, the Red Men, the United American Mechanics, the Good Templars, Sons of Temperance, and a number of others with clear political or moral objects, had come into existence, all of which afforded a measure of charitable relief to their members; but the credit is accorded to John Jordan Upchurch, the founder of the Ancient Order of the United Workmen, at Meadville, Pa., in 1868, for the initiation of the movement toward the organization of a new class of fraternal orders that was to make the provision of a substantial death benefit their primary object. Upchurch's effort was linked with a desire to bring together in relations of mutual help and good understanding the large group of workers that the rapid expansion of manufacturing industry during the Civil War had centred in many of the American cities. He sought to meliorate trade troubles the while joining the new craftsmen in an effort for self-help, socially and intellectually, and against the one greatest certainty and uncertainty of life, to wit, the contingency of death, which was apt to leave the worker's dependents helpless in a strange place away from even the meagre living that the widow and orphan could find in village and rural communities.

Characteristics.— In each decade since the close of the Civil War period scores of new fraternal benefit orders have been formed, with differing plans of operation but with the same general character. Some have been spurious and sought to make fraternalism a source of private profit. Many have remained local in-

stitutions, while many others have become general and have extended over the United States and Canada. A number are sectarian or racial in their constituencies, being confined to Protestants, Catholics or Hebrews. To most of the orders men alone are eligible; yet not a few are open to both sexes and a few are purely women's societies. Some of the earlier moral or political orders have in the interval since organization adopted a plan of death benefits, and most of the later organized trade unions have such a benefit. The genuine fraternal benefit orders use the lodge system, with the social and moral influence of its ritual and form of initiation and its fraternal bond, to carry out the object of co-operative insurance.

The earliest orders, in addition to certain moral and physical tests, called for a uniform contribution from each member to meet benefit claims as these arose. This was pure charity in essence if not in form and left the future utterly without provision, under the assumption that there would always be members enough and willing to meet demands on call. The United Workmen in particular was organized under independent State jurisdiction. This proved a source of weakness to the order and disclosed the insufficiency of its financial plan sooner than with others which began with a general jurisdiction and so had the younger lodges to share the inevitably increasing claims of the older.

At this period scientific practice of life insurance had not yet been fully worked out and such business corporations as were operating in America did not cater to the man in moderate circumstancess, whereas the lodge appealed to him and met his needs for social sympathy and relaxation and for a warm helping hand in emergency, especially in our migratory American life. The movement toward fraternal insurance was strongly accelerated during the decade following the panic of 1872 by the failure of a large number of business companies that were insecurely organized or badly managed.

Learning from experience that was sometimes costly, even as the business corporations before them, the fraternal benefit orders soon passed from the first crude idea of a uniform contribution and came to depend on a closer medical selection and a contribution graded according to the member's age at entry; but even so they fell short of a condition essential to permanence in not realizing that sufficient income must be had for both current needs and for a reserve accumulation to meet future obligations, since under a purely mutual scheme the members who pass away first must contribute to not only their own but to the benefits of those who pass away later.

Doubtless a better understanding with the students and leaders of actuarial science would have saved much confusion and loss, but fraternal leaders in the end have profited by their experiences and the fraternal orders have been an acknowledged educational influence that has made America of to-day the best insured portion of the world. A table of mortality built upon fraternal experience, adopted in 1899, has become a standard for rates and since that date a continuous effort has been made to bring fraternal insurance to a scientific basis.

Development.— Looking back over the less than 50 years of fraternal insurance, a steady improvement in plans and methods is to be noted, as well as an amazing expansion of the idea, as shown in the accompanying table. Ignorance and error may be freely acknowledged, but none the less it was an altogether natural event and thrilling now to contemplate that the great democracy of the West, after gaining a new consciousness of solidarity from four years of civil strife, should launch on a great co-operative effort touching that event of life which deprives the great majority of families of their chief support.

To the splendid record of financial benefits provided, hundreds of thousands of families that would otherwise have been left nearly destitute, must be added the incalculable moral, social and educational influence the lodges have had upon American life during the past half-century. The benefit orders are a true expression of democracy and a fruit of the self-respect and self-reliance for which popular self-government stands.

Owing to the insecurity of the earlier plans and in some cases to poor business methods numbers of benefit orders have come to grief, while others have found it advantageous to amalgamate. Those that have wisely forestalled trouble by increasing rates and bettering methods, and the younger orders that profited by the experiences of predecessors in the field, have entered upon a new era of development which will be marked, not so much by large numbers as by strength and quality.

The nearly two decades of the 20th century have been troublous for the fraternal orders owing to the agitation and uncertainty attending discussion of rate changes and the elimination of the endowment or short-term certificate, which latter proved as deceptive as the tontine forms of old-line policies and is no longer offered by any reputable society; yet according to the completest showing available, that of the 'Spectator Year-Book,' the following table represents conditions on Jan. 1, 1917:

SUMMARY OF 560 FRATERNAL ORDERS OF UNITED STATES AND CANADA AT THE CLOSE OF 1916

Certificates in force 1 Jan. 1917	9,191,860
Number of lodges	124,912
Income for 1916	$178,867,638
Disbursements	141,280,882
Claims paid	116,769,888
New insurance written	1,182,642,577
Assets 1 Jan. 1917	319,392,839
Liabilities	81,846,123

RESULTS OF 180 OF THE LEADING ORDERS AT THE CLOSE OF 1917

Net gain in certificates	168,904
Benefits paid, 1917	$113,763,279
Total insurance in force	9,634,662,126
Assets 1 Jan. 1918	344,618,330
Liabilities	*84,116,631

* Includes $62,529,414 reserves.

About 100 minor orders are not included in this tabulation. Of the 560 societies included, 380 have $1,000,000 or over of insurance in force. A compilation made by another reliable authority, the *Fraternal Monitor*, gives the aggregation of death benefits paid since organization by American benefit societies, to the end of 1917, as $2,344,738,818. The amount of sick, hospital and funeral benefits paid by local lodges is not available but the aggregate of

such benefits paid by the larger benevolent orders offering them is $624,866,506.

The fraternal beneficiary orders have in recent years had a yearly addition of 1,000,000 new members, the yearly payment of over $100,000,000 in death benefits, the yearly increase of over $1,000,000,000 in insurance in force, and a substantial increase in assets over immediate liabilities.

Some of the larger orders have latterly provided old age and disability benefits and many of the local lodges have from the first had in operation special sick, hospital and funeral benefits for such of the membership as wish to share them.

New Standards Set.—A long and definite advance in fraternal history was registered in 1886, when, pursuant to a call fathered by the Supreme Lodge of United Workmen, 16 of the leading orders met at Washington, D. C., and formed a federation, entitled the National Fraternal Congress, with which others soon affiliated. In 1901 a number of orders formed a separate organization, the Associated Fraternities of America. The two bodies, by means of yearly gatherings and discussion, proved a good influence in setting standards and developing uniform and business-like methods.

The efforts of these federations, not always harmonious at first, at length made for unity of purpose and brought them to actual unity in 1913. The results of many years of experience, criticism and agitation found fruition in 1910, under the guidance of the National Convention of Insurance Commissioners held at Mobile, Ala., in a model fraternal code, which was slightly modified in 1912 at New York. This so-called Mobile bill, or the later New York Conference bill, was promptly enacted into law by a number of States, and now controls in 37.

During the years when the necessity for more adequate rates was becoming apparent, as some orders made provision for an increase rather than resort to more than the monthly calls that had come to prevail, their action was contested by individuals in a number of cases. The State courts in Iowa, New Jersey and New York rendered decisions adverse to the right of particular orders to adjust their rates, while Connecticut and Texas rendered favorable decisions. A case was in due course carried up to the United States Supreme Court, which in 1916, in Green *v.* The Royal Arcanum, gave decision at the hands of Justice Hughes practically securing this right to the orders on the ground that a benefit certificate is not a mere business contract but an agreement among the holders for no other consideration than that mutually provided and which all were bound to make good.

By means of the uniform code the characteristic features of fraternal benefit orders are now written into statute law generally as societies having a lodge system, with ritualistic form of work and a representative form of government and making provision for mortuary benefits, to which may be added benefits in case of sickness, accident and old age, providing disability benefits do not begin under the age of 70. Besides provisions for the more responsible conduct of their business and a closer public supervision, the uniform law provides for a standard of valuation to be used from 1917 and to which each order must attain by progressive improvement, or else by the end of three years adopt increased rates for new members and hold the funds for such members in a separate class.

Whole Family Protection.—A new development in fraternal circles is a plan for extending fraternal insurance to the minor children of members. The orders have hitherto allowed membership of one or both parents and of minors at the age of 18. The States of Connecticut, Iowa, Kansas, Maine, Massachusetts, Michigan, Missouri, Nebraska, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Oregon, Rhode Island, Texas, Utah and Wisconsin had by the first part of 1918 provided for the insurance of the children of members of fraternal orders. A uniform bill for whole family protection, adopted by the National Convention of Insurance Commissioners in 1916, has been followed in general. The plan of the industrial companies is used with a separation of funds in a juvenile department. Whole family protection is in wide use among the friendly societies of Great Britain.

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INSURANCE, Group. See GROUP INSURANCE.

INSURANCE, Guaranty. See GUARANTY INSURANCE.

INSURANCE, Health. See HEALTH INSURANCE.

INSURANCE, Industrial. Industrial insurance may be defined as retail family insurance. While in scientific principles it does not differ at all from ordinary life, or "annual premium," insurance, in practice its distinctive features are: (1) That instead of having its policies written for $1,000 and multiples thereof at varying premiums according to mortality tables, its policies call for premiums of five cents, or some similar unit, and multiples thereof, the amounts of insurance varying according to age; (2) the premiums, instead of being payable annually, or semi-annually, or quarterly, are payable weekly; (3) these premiums are called for weekly by collectors, instead of being remitted by mail; (4) the amounts of insurance payable are based upon mortality tables drawn from experience in industrial insurance, and these tables differ very widely from the tables used by the ordinary companies; (5) the insurance is taken upon lives between ages 1 and 65, without distinction as to sex. Industrial insurance is so called because it is the insurance of the working classes, and for this reason it has grown very rapidly.

History.— For its origin industrial insurance must point to the guilds of the Middle Ages, whose place was taken in England, after the Reformation, by burial societies or clubs. These were voluntary associations, meeting periodically and collecting dues and undertaking to bury members out of the fund so paid in. The dues were the same for all ages, and the management was so bad that up to 1867 about 14,000 of the clubs out of 38,000 had collapsed and a large majority of the existing remainder were insolvent. In 1849 the first industrial life

insurance company was founded in England, called the Industrial and General; three years later an offshoot, called the British Industry Life Insurance Company, was formed; two years after this, in 1854, the Prudential Assurance Company, which had been in existence six years as an ordinary company, took up the industrial business and soon absorbed the British Industry. At the outset the business was experimental, as actuaries had insufficient data upon which to base calculations; and several tables of benefits for the weekly premium of a penny succeeded each other, widely differing in amount. The first table ran from ages 10 to 50; age 10 was found too high for practical working and the table was run down to age 7; then a demand arose from the people for insurance at younger ages, which was first met privately by an agent of the Prudential on his own account. His fine business record attracted the attention of the officers, who found it arose from his practice of himself insuring the younger members of the family. This discovery led to the company's making its system a real family insurance. It was not successful until all ages were accepted. Therefore the business grew rapidly, so that at the end of 1917 the Prudential had 21,730,468 industrial policies in force, secured by £53,602,348 of assets credited to the Industrial Branch, besides £53,642,748 assets credited to the Ordinary Branch. The Board of Trade exhibit of regular industrial insurance (that is, excluding friendly societies) in Great Britain shows the steady and rapid growth of the business, as will be seen from the following table:

INDUSTRIAL INSURANCE IN GREAT BRITAIN.

YEAR	Number of companies	Number of policies in force	Insurance in force
1890	8	9,432,778	£86,203,873
1900	14	18,653,846	181,135,538
1910	14	29,149,924	292,689,157
1915*	19	38,004,956	433,900,645

* During the progress of the war these tabulations were discontinued.

The number of policies in force in the industrial companies of Great Britain exceeds four-fifths of the population of the country.

In America the first weekly premium experiment of importance was the connection of the Hildise Bund, a society which received premiums weekly and used them to pay to the Metropolitan Life Insurance Company to be credited upon quarterly premiums on policies issued by the company on the lives of the members of the Bund. A large business was done on this plan for several years after 1869, amounting at one time to $7,500 per week. There were other similar societies in name, but they seem not to have done much business. The English experiment had attracted a good deal of attention in America, and various industrial insurance companies were formed which, however, never got to the point of issuing policies. There was a good deal of literary discussion which culminated in a state report in 1874 by Commissioner Clarke of the Massachusetts Insurance Department, describing the work of the English Prudential Company and setting forth the principles of industrial insurance. In 1875 the Prudential Insurance Company of America, then a small corporation in Newark, N. J., known as the Widows' and Orphans' Friendly Society, changed its name to the Prudential Friendly Society and in November began the industrial business on the lines of the London company, after which it was named. Before it attained much growth the John Hancock Mutual Life Insurance Company of Boston, the Germania Life Insurance Company of New York (which, however, soon ceased writing industrial insurance), and the Metropolitan Life Insurance Company of New York, old line companies of experience, began the industrial business. The progress of this system of insurance in the United States has been wonderful. Its first policy was issued in America only 43 years ago; at the end of 1918 there were in force in the United States and Canada nearly forty-one millions of industrial policies against thirteen millions of annual premium policies (1917) — the amount insured thereby being respectively about $5,600,000,000 industrial insurance and $23,000,000,000 annual premium insurance (1917). About 91 per cent of the industrial business in America is in three companies — the Metropolitan Life of New York, the Prudential of Newark, N. J., and the John Hancock of Boston.

The following table shows the rapid growth of the business:

INDUSTRIAL INSURANCE IN THE UNITED STATES AND CANADA.

YEAR	Number of companies	Number of policies in force	Insurance in force
1880	3	228,357	$19,579,780
1890	9	3,875,102	427,882,964
1900	17	11,115,908	1,450,324,885
1910	22	23,044,162	3,179,489,541
1918	31	41,000,000	5,600,000,000

The following table shows how extensively the working classes take out this insurance, by a comparison of the population of five large cities, as estimated by the Census Bureau, with the number of industrial policies in force in three companies (other companies are doing business in most of these cities):

CITY	Estimated population, 1 July 1917	Number of industrial policies in three companies in force 31 Dec. 1917
Greater New York	5,737,492	3,993,708
Philadelphia	1,735,514	1,910,546
Saint Louis	768,630	866,875
Baltimore	594,637	681,430
Cincinnati	414,248	425,096

There are in the United States over 35,000 agents writing industrial insurance and the head office clerical force numbers several thousand. The industrial claim payments in 1918 were about $90,000,000.

Industrial insurance was introduced in Australia in 1884, but was not vigorously prosecuted until 1887. By the end of 1915 there were nine companies, with 623,790 policies in force, assuring £14,357,173. In New Zealand the government started the business of industrial insurance in 1875 but quickly discontinued it. In 1881 the government revived the work of the Industrial branch of its Insurance Department, but finally abandoned it in 1887. Among other British possessions there are a few small companies in South Africa and at least one office has been opened in India.

The business flourishes best in Anglo-Saxon countries. It has not attained large proportions anywhere else, except in Germany, where in 1914 there were 17 companies having nearly eight millions of policies in force for $375,000,000. The business is transacted on a limited scale in Austria-Hungary, Holland, Belgium, Denmark, Sweden, Norway, Finland, Switzerland and Brazil.

Policy Contracts.— We have said that the unit in industrial insurance is the five-cent premium or some similar unit; the amounts of insurance vary with the age of the insured and, during the infantile period, with the duration of the policy. The curve in the mortality table descends from birth to age 12 and then ascends and the companies for the same premium increase the amount of insurance each year after issuance of the policy, up to age 10. The amount of insurance thereafter does not decrease, for the policies are, like the annual premium policies, constructed with a level premium.

Policies are issued on various plans of insurance, efforts being constantly made to meet what appears to be the popular demand. For several years past a great majority in this country have been issued on the whole life plan with premiums ceasing at about age 70 or 75. The following table of the largest of the companies, which has in force nearly 42 per cent of the American business, shows the benefits payable on children for a five-cent premium under the company's principal infantile table:

INFANTILE WHOLE LIFE

Payment of premium ceases on first anniversary of date of issue after insured reaches age 74.

Amount payable provided death occur after policy has been in force for the following periods.

FOR A WEEKLY PREMIUM OF FIVE CENTS

Age next birthday	Under 6 Mos	6 Mos.	1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs.	6 Yrs.	7 Yrs.	8 Yrs.
2..	25	25	34	40	48	58	70	110	150	214
3..	25	34	40	48	58	70	110	150	208	
4..	25	40	48	58	70	110	150	201		
5..	25	48	58	70	110	150	194			
6..	29	58	70	110	150	187				
7..	35	70	110	150	180					
8..	55	110	150	173						
9..	75	150	167							

No policy issued under this plan at a higher premium than five cents.

It will be noticed that the amount payable increases materially after the policy has been in force for several years. The reason is that in the early years insurance is not needed in so large amounts and the unearned part of the premium charged is used to increase the amount of insurance in the later years. Technically in industrial insurance adult insurance begins at age 10 because the old actuarial tables were not carried below that age. Above 10, at each advancing age at entry, the amount of insurance for the same premium decreases, as can be seen in the next paragraph.

Notable increases in benefits have characterized the tables issued in recent years. In the largest American company there have been three substantial increases in the benefits under the whole life table, in 1907, 1909 and 1916 respectively. In 1906 the insurance for five cents for a person entering at age 10 was $120; now it is $162. For a person entering at age 20, the amount has increased from $87 to $113; at age 30, from $67 to $82; at age 40, from $50 to $58; at age 50, from $35 to $38. Moreover, the policies issued prior to 1907 did not contain the present provision for cessation of premium payments on the anniversary after age 74. For age two at entry, weekly premium five cents, the present benefit, after age 10 is reached, is $214; under the 1907 table the amount was $173; while in 1906 the amount was $120 after age 10, increasing by guaranteed additions to $138 at age 49, at which age the policy became an endowment. The amount in benefit below age 10 has in many instances been doubled. These increased benefits have been made possible by the improvement in general mortality, satisfactory earnings from investments and marked reductions in the expense rate.

Beside whole life, some of the companies issue other forms of policies, such as endowments maturing at age 80, and 20- and 25-year endowments. Twenty-payment life policies are little in demand. The largest of the companies issues in considerable numbers a novel and attractive contract known as the "Convertible" policy, which is a life policy with premium payments limited to a comparatively short period, after which the insured, if he desire to continue payment of premiums for additional short periods, may convert the policy into an endowment whose date of maturity is successively brought nearer and nearer as premium payments are continued. Twenty-five per cent of the Industrial business of the company mentioned is written on this convertible plan. Industrial insurance on the "group" plan has also been offered to the public, but the results have been negligible.

The provisions of the policies in industrial insurance do not differ in principle from the annual premium policies. They are usually incontestable after one or two years and free from restrictions as to residence and travel. Because of the small premium payable weekly and the rather superficial medical examination, full benefit is usually deferred six months or a year. In the principal American companies, only one-half is paid if death occur within six months, with full benefit thereafter. In Great Britain the first year benefits are rather less liberal than in America. The insurance under industrial policies is payable immediately upon receipt of proofs of death; and these proofs are prepared by the companies' agents without charge. The intention of the insurance being mainly to provide for expenses of sickness and

death, everything is done to facilitate the payment of the premiums to the company and of the claims to the insured. Collectors call weekly for the premiums; the companies have local offices convenient to the policyholders, for the payment of death claims and the service of policyholders generally.

Special Concessions.— Four weeks' grace are allowed in the payment of premiums, within which time claims are paid even if premiums have not been. In one of the largest companies, policies with premiums not more than twenty weeks in arrears are revived without regard to the health of the insured, and this practically has the effect of extending the grace period to twenty weeks. In the two other principal companies a similar concession is granted for thirteen weeks. Paid-up or extended insurance is granted upon lapse after three years, the provision usually being automatic — that is, no action being requred of the policyholder. Cash surrender values are usually granted after five or ten years. The weight of opinion is against early cash values, not only because they are small, but because they unduly tempt the policyholder in slightly straitened circumstances to give up his much-needed insurance. In cases of real need, however, the companies have adopted a liberal policy in the matter of cash values. Revivals are freely granted in cases of lapsed policies and where policies have been long lapsed, so that payment of arrears is difficult, the companies loan the amount of arrears on the security of the policies. Special allowances are made in cases of long strikes and lockouts, or of widespread suffering through calamities such as fire, flood or earthquake, death-claims usually being paid even if policies are lapsed.

Some of the companies grant full immediate benefit under adult policies in case of accidental death. The two largest of the American companies provide in their policies that in event of certain forms of total and permanent disability one-half of the insurance is immediately payable and a fully paid-up policy for the balance is issued at the same time.

Critics of the comparatively high cost of industrial insurance generally overlook the fact that much of this cost is incurred in the service that is rendered to the policyholder in sending an agent to his home weekly to collect the premiums. This fact is strikingly illustrated by a clause that has been incorporated in the policies of the largest American company for several years past and that has been made retroactive as to all of its existing policies, under which a premium allowance of 10 per cent is granted to any policyholder who has paid premiums continuously for at least one year direct to the home office or one of the district offices of the company. In this way the policyholder who is willing to forego the service of the agent is given the benefit of the saving of expense to the company.

Mutuality.— Prior to 1915, most industrial policies were issued as non-participating contracts. A change, however, came in 1915, one of the most notable years in the history of the business. On 6 January of that year the Metropolitan was converted from a stock to a purely mutual company and later in the year the Prudential of Newark also became in effect a mutual company, mutualization having been accomplished except for the non-assent of a very small minority of the stockholders. The mutualization of the Metropolitan was called by the Superintendent of Insurance in New York State in his annual report, "by far the most noteworthy event of the insurance year." The mutuality of the Metropolitan, Prudential and John Hancock (long a mutual company) means that all but a comparatively small portion of the industrial policyholders in America now have — along with the annual premium policyholders — the right of control and the title to the profits of the business.

The fact that policies issued prior to 1915 were non-participating, however, had not deterred the directors of the larger companies from turning surplus earnings over to the policyholders. In 1897 the Metropolitan surprised the insurance world by voluntarily declaring dividends — or "bonuses," as they were subsequently called, to distinguish them from dividends paid as a matter of contract — amounting to over half a million dollars to its industrial policyholders. These voluntary payments were continued each year, with important additions from time to time, finally reaching the sum of $6,000,000 yearly, and the company has the remarkable record of having paid or credited to industrial policyholders during the years 1897–1915, with no stipulation in the policies, expressed or implied, over forty-nine millions of dollars in its various forms of bonuses, while the additional cost of concessions in reserve liability exceeded four and one-half million dollars. The Prudential similarly paid or credited over twenty million dollars prior to mutualization. The mutualization of the companies, which extended participation to existing as well as new contracts, simply means that dividends to industrial policyholders, which in 1918 alone amounted in this country to over nineteen million dollars, have now become a matter of contract, rather than of purely voluntary action. Dividends and bonuses to industrial policyholders have taken the form principally of cash payments or credits on premiums, of additions to death claims or maturing endowments, and of relief to aged policyholders, either by maturing the policies as endowments or by waiving collection of premiums.

Mortality.— When the cost of industrial insurance is considered, the first thing to be noted is the increased mortality among the industrial classes. Let us compare the number per thousand dying at each of several specified ages according to (a) a United States Life Table compiled by Prof. James W. Glover from census returns for the eleven original registration states covering the deaths reported in the years 1909, 1910 and 1911· (b) the Medico-Actuarial Table, excluding the first four years of insurance, based on a portion of the experience of the principal American life insurance companies during the years 1885–1909 under annual premium policies, which table was used as a standard by the Joint Committee in charge of the recent Medico-Actuarial Mortality Investigation; and (c) death rates based on the experience of the Metropolitan Life Insurance

Company during the seven years 1907–1913 on its standard industrial risks.

DEATHS PER 1,000

AGE NEXT BIRTHDAY	Glover's United States life table	Medico-actuarial table (ultimate)	Metropolitan industrial experience, 1907–1913
25	5.4	4.7	7.2
30	6.3	4.9	9.2
35	7.7	5.0	11.2
40	9.1	5.5	13.3
45	11.0	7.0	15.5
50	13.8	9.8	19.2
55	18.5	14.6	25.3
60	26.7	21.9	35.3
65	38.2	35.4	53.3

While the above tables are not in all respects strictly comparable, they afford a rough comparison of the mortality under industrial policies with that under annual premium policies and with the general population. A glance at these tables will show that the mortality under industrial policies at the above ages ranges from 150 to over 240 per cent of that under annual premium insurance. Industrial policies have shown a notable improvement in mortality in recent years — more so than annual premium policies — but it is likely that even at the present time, the mortality is at many ages more than double that for annual premium policies.

The comparison of industrial mortality with general mortality shows a less, but still large, percentage of difference. It is reasonable that it should be so, because, in the first place, industrial insurance in this country has not yet reached, in proportionate amounts, the agricultural and rural population, which is so large a percentage of the whole population. In the second place, the mortality of the working people in cities is large, because of the exposure, the mode of life, the hard toil and confinement, the carelessness of self which the observation of everybody must have noted among working men and women. To some extent there is also a selection against industrial companies, often unconscious, which is the correlative of the unconscious selection against whole life as compared with endowment policies in annual premium companies. A man vaguely conscious of low vitality will insure himself more readily than his opposite, just as one vaguely conscious of superior virility will prefer endowment to whole life insurance.

Insurance of Children.— The insurance of children has been the subject of much discussion in England and America and legislation against it has been proposed; but no law of prohibition has been passed in any State where the business has been well established. In England the law has remained for many years permitting the insurance of children within the limits previously adopted and maintained by the companies; and this after repeated Parliamentary investigations. In America, New York State in 1892 adopted as part of the insurance code a provision authorizing the insurance of minors according to the table of benefits in use by the companies. The New Jersey legislature also passed a permissive law in 1907. The Province of Ontario, Canada, adopted a similar table at about the same time as New York State and within the past few years the Provinces of Quebec, Saskatchewan and Alberta have taken like action. In upward of 20 States, as well as in the United States Congress, proposed legislation forbidding the insurance of children has been defeated — in many States repeatedly. In Massachusetts in 1895 the joint legislative committee took six weeks to investigate the subject, examining hundreds of witnesses, resulting in a vote of 143 to 29 against the prohibitive bill. Colorado is the only State which forbids the business and the law was passed there without a hearing of the company which had only recently begun business in the State — in other words, in anticipation of, not after experience of, evils. A bill introduced by the insurance department permitting child insurance is pending. So France, which is without experience of industrial insurance, and Belgium, where the experience has been very limited, have passed prohibitive acts, while in Australasia, where such insurance has been written for years, New Zealand has passed a law on the lines of the English permissive act. Under the law of New York State the maximum insurance permitted on a child under age two is $30; age three, $34; age four, $40; age five, $48; age six, $58; age seven, $140; age eight, $168; age nine, $200; age 10, $240. From the above and from the table of benefits previously printed, it will be apparent that at the earlier ages the insurance is simply burial insurance, while at the older ages it may amount to a very respectable sum. No case of child murder or abuse for insurance has ever been shown in the United States. In England the matter is thus summed up by Dr. Jones of the Royal Southern Hospital in Liverpool (where child insurance is most common and has been for many years) in a book 'On the Perils and Protection of Infant Life': "The incentive to child neglect and child murder is *not* the prospective receipt of insurance money." In America, in 1905, the Armstrong Committee appointed by the Legislature of New York State, after the most searching investigation of life insurance ever conducted in this country, declared: "It may be added that the committee is also without facts which would warrant the prohibition of insurance of children. . . . In the absence of further evidence the committee believes that legislation would be unwise." In fact, as time has gone on and industrial insurance has increased in magnitude and become better known, the realization seems to have come that criticism of child insurance has been founded on a very shadowy basis, for agitation against it, once so widespread, has in recent years practically ceased.

The companies usually limit the amount of child insurance to the amounts fixed by the New York statute, printed above; and the rule in case of over-insurance is either for all companies to cut down the payments proportionately or for the companies issuing the latest policies to return the premiums. No specialty of child insurance is made. Industrial insurance is, as we have said, family insurance. This is strikingly shown by comparing the percentage of population at various groups of ages, as shown by the last United States census, with

the percentage of premium-paying policies in force at the same ages in the largest industrial company:

AGES	Percentage of population census, 1910	Percentage of policies in force, 1910
1 to 4, inclusive	9.17	7.58
5 to 9, "	10.63	11.23
10 to 14, "	9.92	12.15
15 to 19, "	9.87	11.79
20 to 29, "	18.78	18.60
30 to 39, "	14.56	13.76
40 to 49, "	10.60	10.42
50 to 59, "	7.28	8.09
60 to 69, "	4.30	5.02

Expense.— Like everything else sold at retail, the cost of industrial insurance is high. Its cost, however, is scientifically adjusted. The loading on the net premium is necessarily much higher than that used in annual premium companies; and, as we have seen that the mortality is double at some ages, the cost of industrial insurance is necessarily great compared with annual premium insurance. The expense ratio is high because of the system of weekly collection of premiums, because of the large number of policies for small amounts which have to be recorded and cared for at the head office and the district offices and because of the heavy lapse rate during the early existence of the policies. As the premiums are payable weekly there are 52 opportunities each year for lapsing as against one to four in annual premium companies; and in the first year of insurance the lapse ratio is high. All of these early lapses are a pecuniary loss to the companies; and this partly accounts for the high expense ratio. Of the business lapsed within the first three years, more than one-third goes off within the first three months — much of it with only one or two weeks' premiums paid — and three-fourths during the first year of the life of the policy. The lapses in industrial insurance, while they cause a heavy loss to the companies, do not usually represent any serious loss to the insured. The premiums are weekly and the policies are carried on grace for four weeks after lapse, with a practical extension of the grace period to a term of from 13 to 20 weeks in the principal American companies, as previously described. Policies lapsing for non-payment of premiums can usually be revived upon evidence of insurability within one year, as a matter of policy contract, and after longer periods under the practice of the principal companies. Here there is no loss to the insured. In case the policyholder is unable to pay his arrears in cash, provision is generally made that they may be charged against the policy in the form of a lien. The largest company has recently offered special facilities for the revival of family groups on this plan. Here, again, the insured loses nothing. If the lapsed policy is not revived, but new insurance is taken, the amount of insurance at each advancing year of age is very little less than at the preceding age. If the policy is kept in force for three years, the insured is entitled to extended insurance or paid-up insurance for a reduced amount, the provisions varying in the different companies. After ten years, cash surrender values are available under policies now being issued — in one company, after five years.

It goes without saying that in all these cases lapses are no great source of loss to the insured. There can be no doubt that the lapses in industrial policies are very largely by those who subsequently take new insurance, suffering no loss at all in case of revival, and otherwise suffering only the small loss arising from partial benefits during the first year and the small decrease of benefits by reason of advanced age. The fact is there are many who insure and lapse and reinsure, according to their disposition of mind and their resources, with small loss to the holders but large loss to the company, which is put to the expense of commissions for placing the business and the large expense of caring for it. After three years the business is very persistent, comparing favorably with annual premium business. The average duration of the policies in force in the largest English company is nearly 14 years, and that of the policies of the largest American company (which has been in business for 25 years less than the English company) about nine and one-quarter years.

The proportion of lapsed policies has been very greatly decreased as the business has developed. This is forcibly shown by tabulations which were made by the largest company, whose business amounted to 42 per cent of the industrial insurance in this country, showing the lapse rate, during the first year, of industrial policies issued during various periods:

INDUSTRIAL LAPSE RATES

POLICIES ISSUED DURING	Per cent of issue lapsed during			
	First three months	First six months	First nine months	First twelve months
1896	38.17	52.71	58.58	61.87
1903	26.96	39.90	46.03	49.89
May, 1909	22.34	32.08	37.50	41.10
December, 1911	15.86	26.18	31.86	35.13
1916	10.79	18.90	23.19	26.04
1917	8.71	16.21	20.15	22.66

This company has for the last few years shown a remarkable record of the lapse of industrial policies compared with the lapse record of other large companies which do not do any industrial insurance business. In 1918 its percentage of terminations of industrial policies less revivals to the mean number of policies in force was 5.35. The corresponding percentage of the largest ordinary company which issues no industrial policies was 6.50. The industrial insurance company named showed 88½ per cent of the industrial insurance written in 1918 in force at the end of the year. Notwithstanding the weekly opportunity for lapse of industrial insurance, this was only six points less than the rate of persistence of policies in the ordinary department of the same company.

This decrease in lapses has been one of the contributing causes to a very remarkable reduction in the expense rate of industrial insurance, which has been effected through increasingly efficient management. In the largest of the com-

panies the expense rate since 1895, exclusive of welfare expenditures, has been as follows:

1895	47.88	per cent of	premium	income	
1900	43.84	"	"	"	"
1905	42.80	"	"	"	"
1910	36.07	"	"	"	"
1915	33.40	"	"	"	"
1918	33.22	"	"	"	"

The increased economy of conducting the business has not been effected, however, at the expense of the agents; on the contrary, the average earnings of the agents in the company mentioned have more than doubled during the last 15 years, and the personnel of the agents has improved accordingly.

Intermediate Policies.— The expense of insurance to the industrial classes has been greatly reduced by the introduction of what are known as intermediate policies. These are policies which in 1896 the two largest industrial companies designed and issued for the working classes. They are policies for an even amount of $500 each, premiums payable yearly or in half or quarter years. The premiums are based on special tables of mortality compiled from the accumulated experience of risks of this class and the loading is less than that used by many companies for annual premium policies. The result is a moderate priced ordinary policy contract issued on all the usual forms — whole life, limited payment and endowment — with participation in surplus earnings. A working-man who has got beyond the necessity of making small weekly payments and can afford to pay dollars annually where he has been paying cents weekly, finds in these policies insurance whose cost does not differ greatly from that his rich neighbor buys. In fact, in many instances, particularly under endowment policies, which constitute most of this business, intermediate insurance has actually proven cheaper than other ordinary insurance. There were at the end of 1917 about 1,250,000 intermediate policies in force in the United States and Canada, insuring over $600,000,000. The English Prudential had at the same date 929,618 ordinary policies in force, of which a very large proportion is endowment, averaging about £112 per policy, the premium averaging a little under £6. The English Prudential policies are also as a rule participating. The industrial companies on both sides of the water claim that by the issue of this class of policies they have perfected the system of industrial insurance and have performed their full duty to the wage-earners by furnishing insurance adapted to the condition, means, habits of life, and requirements of all; weekly premiums for those who can afford no better, and for those of an age unsuitable for large insurances; annual premiums for small policies with dividends as earned, bringing the cost down as nearly as possible to the cost of ordinary insurance as purchased by the well-to-do.

Moreover, industrial or intermediate insurance is often merely a stepping-stone toward ordinary insurance for larger amounts. Great numbers of persons insured under industrial policies, adult as well as infantile, later on become financially able to carry the usual forms of ordinary insurance, and their industrial policies have educated them to the value of insurance, which they might not otherwise have realized. It was almost inevitable that the industrial companies should develop an extensive ordinary business. As a matter of fact, the growth of ordinary insurance in the industrial companies has been one of the notable features of recent years, the amount of ordinary insurance in force at the end of 1918 (including intermediate) in the three principal industrial companies in America having reached the remarkable total of $4,237,809,392.

Welfare Work.— Few organizations have the opportunity of reaching and influencing so many people as the industrial insurance companies. The great force of agents going weekly into millions of homes affords a direct means of communication from the company to the policyholder, and the frequency of the agent's visits tends to make him the friend and counselor of the families from whom he collects.

The exceptional opportunity for social service thus afforded has not been overlooked by the companies. They have been active, particularly in recent years, in many branches of welfare work. The principal media of communication between the companies and their policyholders, aside from the agents themselves, are the magazines which are issued by most of the companies several times a year for distribution among policyholders. It has been the object of the companies through these magazines to stimulate better physical, mental and moral development. Special attention is given to the dissemination of information and advice in matters pertaining to health and general welfare. In addition to the magazines, some of the companies issue health literature in the form of leaflets or pamphlets for distribution among not only policyholders but the general public.

The industrial companies have unusual facilities not only for distributing information but for obtaining it. The great number of policyholders under observation, along with the close relations between the agents and the policyholders, give the companies the opportunity to collect information of great social value relative to such matters as mortality, morbidity, unemployment, etc., and some of the larger companies have experts who devote their energies to the study of these subjects.

The Metropolitan Life Insurance Company of New York, which in recent years has specialized to an unusual degree in welfare work, has distributed over 187,000,000 copies of pamphlets and leaflets, has maintained a free nursing service for the benefit of its industrial policyholders, under which more than 1,400,000 visits were made in 1918, has conducted extensive sickness and unemployment surveys — the latter in co-operation with the United States government,— has given numerous welfare exhibits at fairs, expositions, etc., and has rendered invaluable assistance to State, county and municipal health bodies, through the co-operation of its agency force and otherwise, in their efforts to improve the public health, such as "clean-up" and "baby-week" campaigns, education relative to tuberculosis, Spanish influenza and to health laws, and the distribution of circulars in support of proposed health legislation.

Relation of Industrial Insurance to the War.— Two facts stand out prominently in connection with the Great War. One is the inherent soundness of the industrial companies, even under the most trying conditions, and the other is their opportunity for usefulness. The

severest test has been, of course, of the European companies, which have had to contend with war conditions since 1914. The British companies almost without exception waived all war restrictions on policies issued prior to the beginning of hostilities. Up to the end of 1917 the Prudential of London had paid over 160,000 war claims, exceeding £3,400,000, by far the larger portion of which was on industrial policies. In spite of the excessive death losses and of the depreciation in securities and heavy war taxes, the company remains in sound financial condition. There has naturally been a reduction in the dividends to policy-holders and stockholders. The British companies have rendered noteworthy service in ambulance and other Red Cross work, and in many other war activities.

In the United States, war restrictions in industrial policies were likewise waived on policies issued prior to entrance into the war. Even the policies subsequently issued are free from war conditions up to a certain amount of insurance. In one company the amount is $300. Following the armistice, the $300 limit was removed. Valuable service has been rendered to the United States Government by the agency and home office forces in such essentials as food conservation, recruiting, classification of military census forms, Red Cross and other war relief work, distribution of a wide variety of literature, and the selling of government securities issued to carry on the war. The United States Treasury Department appointed Mr. James E. Kavanagh, fourth vice-president of the Metropolitan Life, as assistant to the chairman of the National War Savings Commission, and Mr. Kavanagh was made the organizing head of the government's campaign to organize War Savings Societies and sell $2,000,000,000 of War Savings Stamps. The larger industrial companies, through their agents and home office staffs, inaugurated an active campaign for the sale of the stamps, and the Metropolitan fixed its goal for the year 1918 at $65,000,000. This was passed at the end of August, and the total sales at the end of the year were over $112,000,000, besides over $21,000,000 in the Fourth Liberty bonds, the campaign for which was interjected into the War Savings Stamp campaign.

Both in Great Britain and the United States the industrial companies have subscribed very largely to the various war loans issued by the government. It has been stated that at the end of 1917 the London Prudential held over £25,000,000 of the British 5 per cent war loan. In this country the Metropolitan has taken about $100,000,000 of United States Liberty Loans and Canadian War Loans; the Prudential of Newark nearly $90,000,000, and the John Hancock over $13,000,000.

HALEY FISKE,
Vice-President of The Metropolitan Life Insurance Company.

INSURANCE, International.—At the beginning of the European War in 1914 a plan was proposed for extending the application of insurance to international affairs by means of a fund realized from the contributions of a community of nations joining to provide indemnity against certain common general hazards, such as earthquakes, volcanic eruptions, migratory pestilences, tropical diseases, destructive storms, famine, crop failure, marine disaster, and, above all, the hazard of war and losses falling in war time on private property belonging to citizens of neutral states. The absorption of public attention by the war prevented a wide discussion of the proposal, but a new and surprising development of the insurance idea may easily result from the conference for a world peace that alone can settle the World War. Consult 'War and Insurance' by Josiah Royce.

INSURANCE, Life. Life insurance is the application of insurance to loss or injury caused by death. It may be defined as a contract under which one party called the insurer, in consideration of certain stipulated payments, termed premiums, agrees to pay to another a moneyed benefit upon the happening of a contingency dependent on the duration of a human life. The person whose life is the subject of the contingency is termed the insured, and the party receiving the benefit the beneficiary, while the benefit itself is called the insurance money. The contract when in writing is known as a policy. In practice the contingency involved is either the death or the continued survival of the insured. If the benefit is to be paid upon the death of the insured, it is known as a strictly life insurance contract, if upon his survival to a given age, it is called an endowment. The issue of such contracts is confined to companies incorporated for the purpose and to benevolent and fraternal associations. The fundamental object of life insurance is the protection of families and dependents, or of business interests from the pecuniary loss which is liable to result from the death of the party insured. It furnishes a method of at once providing a fund which shall be available in case of such misfortune, by means of a series of limited payments made during the continued life of the insured. The latter is able for a small consideration to secure the benefit of an immediate investment payable upon the expiration of the contract, instead of awaiting the slow and uncertain process of accumulating a capital which may be defeated by his untimely decease. The business man is thus enabled also to protect his creditors or his business as well as those dependent on him. In case of the endowment the policyholder is able to unite such protection with a fund available for his own use should he survive during a stipulated period. In short, life insurance may be regarded as a method of purchasing immunity against moneyed misfortunes liable to result from death, and appeals with special force to those whose chief dependence is on their daily or yearly earnings. It offers peculiar advantages, too, because it can be placed beyond the reach of creditors and need not be involved in business misfortunes, while the policies themselves can be hypothecated or sold like ordinary commercial securities.

The policies are issued by the companies upon written applications from the purchasers, in which detailed statements are required regarding the health, habits and family history of the applicant, accompanied by the certificate of a physician based on a careful examination. The policy stipulates as to the amount and character of the benefit to be paid, the party to whom it is payable and the premium payments to be received, together with such other provisions as may be needed to express the complete

contract with the applicant. The premiums are usually payable annually or at shorter intervals in advance. The business is done almost entirely through agents who solicit the applications, collect the premiums and otherwise act as intermediaries.

History.— Life insurance in its more modern form was practically unknown until it was introduced into England by the establishment of the Amicable Society in 1696. Other companies were gradually started there. But for many years afterward it was prohibited on the continent of Europe as immoral. Modifications of the system, however, known as annuities and tontines had long been familiar, and the former had been employed as a basis for national loans. It was not until the 17th century that sufficiently reliable observations on human life were compiled to furnish a satisfactory foundation for the business, and that the commercial elements of society attained an importance sufficient to give it the needed support. Companies thereafter multiplied in Great Britain and the business gradually extended to the continent of Europe.

Life insurance was introduced from Great Britain to America, and the first society was organized in Philadelphia in 1759 for the relief of Presbyterian ministers and their widows and children, followed 10 years later by a similar corporation for the benefit of Episcopal clergymen and their widows. Their operations, however, were confined to the classes named. The first company to attempt a general business was the Insurance Company of North America, organized in the same city in 1796. A number of other companies gradually followed in that and other important cities during the earlier part of the 19th century. All these earlier offices, however, combined fire or marine insurance, or banking and trust business, as well as annuities with life insurance, and gradually abandoned the latter. Popular prejudice proved to be too strong, and the economic condition of the country to be too little developed to make its prosecution successful. The real beginning of modern life insurance in the United States dates from the organization of the Mutual Life Insurance Company in New York in 1843, which was quickly followed by that of others, both there and elsewhere, some of which had already secured charters for the purpose. The business of these new companies was confined to life insurance, and their success led to the gradual multiplication of such companies until within 20 years it had attained proportions which made these corporations among the most important financial institutions of the land. The business has since continued to expand until the enormous sums now invested in life insurance in America far exceed those in any other country. Its leading institutions are unrivaled in their size elsewhere, and several are transacting business in every quarter of the globe.

Insurable Interest.— Every form of insurance presupposes some pecuniary interest in the subject insured, without which it would be a mere speculation or gamble and a temptation to crime which public policy does not permit. Where the insurance is on property, such interest on the part of the insured must usually be commensurate with the amount of the insurance. The insured is restricted in his recovery on the policy to a sum which will indemnify him for his loss. This doctrine, however, is relaxed in case of life insurance, since no strictly moneyed value can well be placed on a human life. The principle of indemnity goes no farther here than a requirement that the party procuring the insurance shall have such an interest in the life insured as shall prevent the contract from being a mere gamble on its survival. Any reasonable expectation of pecuniary advantage from the continuance of the life is deemed sufficient, such as dependence or the payment of a debt. Every person, too, is assumed to have an interest in his own life, which he may insure to any amount, and may make the policy payable to any beneficiary whom he may elect so long as the scheme is not a mere cover for gambling.

Classes of Companies.— Life insurance is carried on by two distinct classes of institutions. One consists of those which treat it as an ordinary commercial or financial business, the other, of those which deal with it as a form of benevolence or fraternal aid. The former may be again divided into those in which the premiums are definite in their amount and time of payment, and those which depend on assessments from their policyholders to pay claims as they become due. Life insurance as a business, however, is chiefly carried on by the first mentioned, which are known as old line or legal reserve companies. It has been found the only business method which has successfully stood the test of experience. Two systems have been adopted in this class of companies. One is the mutual, in which the policyholders are regarded as the owners of the corporation, and all profits or surplus arising from the business are distributed among them. Such surplus performs the functions of an ordinary capital. The choice of directors or trustees and consequent management of the company is usually placed in the hands of the members. The majority of companies in the United States are conducted on this system. The other is the stock plan, in which the company is owned and controlled by stockholders, who deal with the policyholders simply as customers and divide the profits of the business among themselves. Higher premiums are charged for mutual policies for the purpose of creating a surplus, which may be eventually returned in dividends to the policyholders. In the stock policy, on the contrary, the holder sacrifices the right to dividends in exchange for a lower premium rate. Some of the companies combine both features, mutual offices issuing also stock policies, known as non-participating, at lower rates of premium. Often, too, a stock capital is added to a mutual company which is restricted by the charter to the amount of dividends which it can receive. When the stock is allowed to share in the profits in excess of its legitimate earnings as an investment, the system is known as the mixed plan. Sometimes, too, the election of directors is apportioned between the stock and policyholders, or, in a company otherwise mutual, may be restricted to the former. In many of the States a capital stock is required by law in the organization of a mutual company until it can be replaced by surplus belonging to the policyholders. The distinctive feature of the legal reserve company, apart from its fixed premiums, is that it must at all times maintain a reserve fund adequate to the payment of its

future obligations, less the future premiums which it will receive; in other words, it must in a commercial sense be financially solvent. It is also known as an old line company because conducted on the principles which have always characterized life insurance as a business until the introduction of the assessment plan.

Assessment companies were started in the United States over 50 years ago for the purpose of furnishing life insurance at lower rates than those charged by the regular old line companies. Instead of a fixed premium, assessments were levied on the policyholders to pay the losses as they occurred. Various methods were adopted for levying such assessments, and, as the policyholders were in theory liable for whatever assessments were needed, they only became insolvent when unable to meet their claims. The plan was an adaptation of methods employed by fraternal orders, and for a while was exceedingly popular among those seeking a cheap form of insurance, since the actual cost of insurance being low in the early years, the assessments were correspondingly light. But the increased cost as time went on ultimately so increased the assessments that it was found impossible to enforce them, and most of the companies were compelled to retire or change their methods. Comparatively few now remain, and the system itself has been condemned by many of the State authorities. Many of the companies were accustomed to assume the character of benevolent organizations in their operations.

Stipulated premium insurance is a combination of the assessment and legal reserve systems with a view to correct the defects of the former. The premiums, as in the old line company, are definite payments, supplemented, if needed, by assessments, and a moderate reserve is carried to reduce or render such assessments unnecessary. It has been employed by some of the assessment companies as a method of establishing their business on a firmer foundation. But life insurance as a business in the United States, as well as in other countries, is chiefly done by old line legal reserve companies, whose definite contracts, financial strength and scientific business methods give to such contracts a commercial standing unattained under any other system.

Industrial insurance is a branch of the legal reserve designed to furnish burial funds for the poorer classes, and especially children. Its principles do not differ from those of ordinary insurance, but its methods are essentially different in many respects owing to the small size of the policies and the character of the applicants. The premiums are payable weekly or at short intervals, and are collected by agents through house-to-house visitations. It was introduced into the United States from Great Britain about 50 years ago, having been an outgrowth of the burial clubs and friendly society system of that country, and has attained enormous proportions in America, as well as Great Britain. See INSURANCE, INDUSTRIAL.

Fraternal and benevolent societies have been popularly associated with assessment companies owing to the similarity of their methods. But they are a distinct class, having the character of social clubs solely for fraternal or benevolent purposes, with a form of insurance as merely one, though it may be their most important, feature. They are strictly mutual in their character. Their general type of organization is that of the ordinary society or club known as a lodge, whose members meet for social or fraternal purposes. The society is formed of a combination of such lodges, through chosen representatives, into a single grand lodge, by which the insurance is carried on, the subordinate lodges acting the part of agents in securing members and collecting the payments. The insurance itself is simply a death benefit allowed to the members under provisions in the constitution, and not a business contract secured by the purchase of a policy. The premiums are paid in the form of dues and assessments, much after the manner of assessment companies, the dues being used for expenses and other incidental features. Efforts are being made to scientifically adjust the payments and benefits of these societies according to the cost of insuring the various members, as is done in the legal reserve companies. The insurance which they furnish is regarded as a species of fraternal aid to the members and their dependents, and their operations are not subject to the same legal constraints as those of business corporations. See INSURANCE, FRATERNAL.

Mortality Tables.—The life or mortality table, from which the premiums must be determined, is at the foundation of the business. The tables mostly employed are constructed from the experience of the companies themselves with insured lives which have been found to have a mortality distinct from that of the population at large. Such a table in its simplest form consists of a statement of the number surviving at the beginning of each succeeding year out of a given number living at any age, from which the number of deaths and percentage of mortality at each age are readily determined. The latter is the important function employed in life insurance. In America the two tables which are chiefly used, and which have been recognized by the various States as standards for determining the liabilities of the companies, are the Actuaries or Combined Experience and the American Table. The former was constructed from the experience of 17 prominent English offices, and was published in 1843. Its general accuracy has since been confirmed by later observations. The American Table was constructed from the experience of the Mutual Life Insurance Company of New York, and came prominently into use about 1868. It was found to represent the actual experience of American companies better than foreign tables which had been employed. Many other mortality tables have been constructed which have obtained a recognized standing. Prominent among them were the Northampton and later the Carlisle Table, both of which were framed from mortality returns of English towns, and were successively used both in England and America, until replaced by the Actuaries' Table. Farr's Tables, constructed from the census returns in Great Britain and published in 1864, have been much used for certain purposes. Various tables, too, have been constructed from observations in other European countries and employed there as standards. The three requisites of such tables for insurance purposes are that they should be safe, should be properly graduated, and should fairly represent the mortality to be expected.

Premiums.—The premiums, which must equal the cost of insurance, are computed from the risk of death, as shown by the mortality table; and since the former are usually fixed sums, while the risk increases with age, it is necessary to charge more than the actual cost in the early years in order to offset the deficiency later on. This excess above the cost is accumulated at compound interest by the company, and constitutes its reserve fund. The rate of interest assumed in the calculation is such as the company is justified in expecting will prevail during the continuance of the contracts. In the United States 4 per cent was formerly considered a safe rate, but the continued fall in interest has led to a general substitution of 3 or 3½ per cent for newer contracts. The payments, which, when thus accumulated will be sufficient on the average to meet the claims on the policies as they fall due, are known as the net premiums, to which additional sums are added for expenses and other contingencies. When thus loaded they are known as gross or office premiums, and are the real amounts charged by the company. These loadings may vary from a trivial addition to 40 per cent or more of the net premium, according to the character of the contract. Premiums in ordinary insurance are usually payable annually in advance, and are then known as annual premiums. Frequently the payments are restricted to a certain number or term of years. These are known as limited payments. Sometimes the entire payment is made at the start. This is known as a single premium payment. The annual premiums, too, are sometimes payable in instalments at shorter intervals to suit the convenience of the policyholder.

Expenses.—The expenses of a life company are chiefly made up of two classes, the cost of securing the business and the office expenses incident to its care. The principal element in the former is the commission or other compensation paid to the agents, which also varies with the character of the contract. It is usually a large percentage of the first premium paid, and a more moderate percentage, in the nature of a collection fee, for those succeeding. The office expenses aside from the salaries of the officers and employees include taxes, fees, rents and those numerous items involved in the care and investment of funds and the conduct of the business.

Legal Reserve.—The legal reserve is the measure of an ordinary life company's liablity on account of its insurance contracts to which, in addition to any other liabilities, its funds must be equal in order that it may be legally solvent. The process of estimating this reserve is known as valuing the policies. Two methods of valuation are used, known as net and gross, dealing respectively with the net and gross premiums charged. The former is generally employed in the United States, and is the one usually adopted by the State authorities. It consists in determining what fund the company must have in its possession in addition to the future net premiums which it expects to receive in order to meet future claims on its policies. This fund is the net or legal reserve. It assumes that all other expenditures are cared for by the premium loadings. The gross valuation, on the contrary, deals with the gross or office premiums, and a certain deduction is made from the resulting fund for assumed future expenses. The latter method is regarded as furnishing the surest test of a company's actual condition, and is sometimes employed when the question of legal solvency is in doubt. The former has the advantage of compelling the use of the premiums for the purposes assumed by the company in their computation.

As in the case of the premiums, the computation of this reserve depends on the future rate of interest which is assumed. In most of the States 4 per cent, as in the case of premiums, was formerly regarded as a safe rate, and even 4½ per cent was at one time allowed, but during recent years 3 or 3½ per cent have been insisted on in the case of new contracts by many of the States.

The mortality on which the sufficiency of the premium depends is lighter in the case of insured lives, owing to their careful selection, than among the general population or that called for by the mortality table for a number of years after the policy has been issued. The cost of insurance in mutual companies is reduced to the policyholders by this lighter mortality. In American companies the mortality among lives that have not been newly selected remains nearly stationary after age 20, or increases but slightly until age 40 is reached, when it is not far from 1 in 100, increasing more rapidly with each age thereafter until it is about 2 per cent at age 50 years and 4 per cent 10 years later.

Form of Contract.—As before remarked, policies may be either participating or non-participating, the chief difference being that smaller premiums are charged in the last and no provisions are included for sharing the profits. Policies for short terms are more frequently made non-participating. The classes of policies most in use are three in number, whole life, term and endowment. In the first the insurance is simply against death and covers the whole term of life, while in the second it runs only for a certain term of years. The pure endowment is an insurance payable at the end of a certain term of years only in case the insured is alive, and is the reverse of a term policy. The ordinary endowment which is almost exclusively used, however, and which has of recent years largely supplanted the whole life policy, is a combination of the pure endowment and the term policy. The insurance money is payable to the insured if alive at the end of the endowment period, or to some beneficiary in case of his previous death. Such endowments are usually issued for periods of from 10 to 30 years.

The annuity is a contract frequently combined with life insurance in which the life insurance principle is reversed. The purchaser buys outright a contract under which he is to receive an annual payment during life. Annuities have been familiar since an early period, and before life insurance became understood was the principal form of contracts dealt in by this class of companies. It secures a fixed income during life to those who may wish to surrender their capital for that purpose.

Still another form of contract is the tontine, in which the funds of a body of subscribers are pooled and the accumulations are divided among the survivors after a certain time. Societies of this kind were formerly common in Europe

and were occasionally found in the United States, though few, if any, remain.

All these different contract forms are now frequently combined in various ways in the ordinary life policy, in order to increase its attractiveness or to better meet the requirements of policyholders. Various methods of premium payments and of paying dividends are also combined for the same purpose. Great ingenuity has been displayed by the companies in making these combinations, and an almost innumerable variety of contracts have resulted. Among those more familiar in the United States are the tontine or deferred dividend policies, in which dividends are accumulated and divided among the surviving policyholders after a certain period; limited payment policies, in which the premiums are limited in number; and instalment policies, in which the insurance money, instead of being payable in a single sum, is converted into a series of annual payments as an annuity. Besides, there are policies insuring the life of more than one partv. When they are payable upon death of either of the parties insured, they are known as joint life insurances; when payable only on the death of all they are survivorship insurances. The greater part of the business in the United States is written either in the form of continued payment life, 20-payment life, or 20-year endowment insurance. Renewable term insurance is another plan for reducing the cost of insurance during the early years and avoiding the accumulation of a reserve. The premium is only sufficient to pay for the temporary cost of insuring and increases with age. The policies are written for a single year or term of years, with the right to renewal at the increased premium. The subsequent increase of cost, however, has been found a serious obstacle to the plan. Preliminary term insurance is also insurance for a single year, but with a right of renewal for the entire period at the same rate of premium. The object of such policies is to enable the company to use the fund which, under the law, must otherwise be added to the reserve during the first year of insurance to meet the cost of securing the business, and has been a favorite method with young companies having a limited surplus.

Dividends.— Dividends are apportioned from the accumulated surplus according to the equitable share of each policy. Many different methods of determining this share have been devised. That chiefly employed in the United States is what is known as the Contribution Plan. The surplus is treated as made up of gains from a lower mortality and expense and a larger interest earning than those assumed in computing the premiums, and the contribution of each policy to the fund is estimated. Dividends are applied according to the provisions in the policy in various ways. They may be used as single premiums to increase the amount of insurance, which is called a bonus addition, or to shorten the term of the insurance, or to the payment of the premium, or may be received in cash. When, as in tontine dividends, they are to be apportioned among a special class, the share of surplus belonging to that class is separately dealt with. Sometimes a minimum future surplus earning, which can be relied on, is made the basis for guaranteeing the payment of a certain dividend in the policy. But as such earnings are uncertain, the usual estimates of these amounts, as given by the companies, are simply expectations and not obligatory as promises. The fall of interest rates has tended to reduce dividends during recent years. At an earlier stage of life insurance, dividends were payable at intervals of five years or more. Afterward, as the business became better understood, the practice of declaring annual dividends in the United States became universal. The subsequent introduction of deferred or tontine dividend policies lengthened the distribution period of the classes to which they were applicable and for a while such policies became exceedingly popular, but the resulting abuses led to their prohibition and a compulsory return to annual dividends. Notes were at one time received by many of the companies in part payment of premiums, but the practice has been for the most part abandoned.

Policy Loans.— Practically all forms of life insurance in which a level premium is paid involve an investment or savings bank element, which is represented by the reserve and is now treated by the law and the contract as belonging, in a sense, to the policyholders. This is the basis of the policy loans which are so generally granted. The portion of the reserve fund belonging to the individual policy, or a portion of it, may be borrowed by the policyholder as a loan bearing interest, on his own note with the policy as a collateral, and is deducted from the insurance money when the policy becomes payable.

Termination of the Contract.— The life insurance contract is terminated either by becoming a claim, which is usually payable at once after satisfactory proofs have been furnished, or by previous lapse or forfeiture through a violation of its conditions, especially non-payment of the premium, or through a voluntary surrender. Policies usually provide for their surrender and allow the insured to receive back a large part of the reserve held against them, called the surrender value, either in the form of paid-up insurance for such an amount as this value will purchase, or insurance of the original amount for such a term as it would pay for, called extended insurance, or else in the form of cash. Statutes in many of the States require similar returns in case of lapse for non-payment of premium, and such provisions are also usually incorporated in the policies. Non-forfeiture laws, as these statutes are called, are designed to prevent the assumed hardship or injustice entailed on the insured through the forfeiture of the money standing to his credit in the reserve fund. This money is regarded as a saving bank accumulation for his future benefit, which is in a sense his property and which should be restored after reserving a surrender charge to compensate the company for his loss. Since healthy lives are most likely to lapse and the cost of insurance to be made greater for those who remain, the selection against the company, as it is termed, is an important element in determining the surrender charge.

Insurance for the Benefit of Wife and Children.— The fundamental object of life insurance as a family protection is liable to be defeated if the policies can be attached for debt. Therefore, statutes have been enacted in many of the States exempting from the claims of creditors policies up to a certain amount

made payable to wives and children. The interests of such parties, too, have been held unassignable, at least without their consent. The life insurance contract, except in the case of benevolent societies, is held to be the property of the party who is the beneficiary, when not otherwise stipulated, and not of the party who may pay the premiums, and can usually be assigned as collateral or sold outright by the owner. Policies not protected by statutes, as above, may, like other personal property, be attached for debt to the extent of their surrender value; and where, as in endowments, two interests are sometimes involved, the interests may be severed.

Medical Examinations.— Medical examinations of applicants for insurance are essential to prevent an inroad of unsound lives that would wreck the company, whose mortality rates are based on the acceptance only of healthy lives. For this purpose medical examiners are employed, who report the health, physical condition and habits of the applicant and the life history of his near relatives. These reports are passed upon by the medical directors of the companies to determine whether the life is up to the normal standard fixed by the company, otherwise the application is rejected.

Sub-Standard Insurance.— Parties who may not be seriously diseased and yet who are not insurable as healthy lives, on account of constitutional weakness or predisposition, are known as sub-standard or under average lives and are insured by some companies as a separate class under special rates of premium, or under special policy conditions, according to the defects of each applicant.

Limitation of the Risk.— Formerly many restrictions were imposed in the policy as to the residence, travel and personal habits of the insured, and military employment and suicide were debarred. These have been gradually modified or removed, until it has become customary with some companies to issue so-called indisputable policies, which in the absence of fraud, can only be forfeited by failure to pay the premiums.

Moral Hazard.— The moral hazard in the business arises from deceptive representations as to health, the temptation to insure as a mere speculation lives in which no insurable interest exists, in the expectation of an early death and the temptation to destroy life through suicide or murder in order to secure the insurance money. The ability of an average applicant to judge of his future health is shown in the higher death rates among those classes of policies where an early death would profit the applicant and is an element of the moral hazard.

Legislation and Supervision.— Until about 1860 little or no supervision was attempted over life insurance by the various States. Legislation concerning it was chiefly confined to taxation of the companies or restrictions on their operations. The multiplication of irresponsible corporations, the growing magnitude of the business and the recognition of the dangers involved in its mismanagement, led to the creation of special departments for its supervision, and the enactment of laws for its conduct by the States of Massachusetts and New York. Their example has been followed by most of the other States. The fundamental aim of these laws is to compel the companies so to utilize and apply the moneys which they receive as properly to carry out the contracts with their policyholders. This is accomplished by requiring the funds in the company's hands to be at all times sufficient, together with its future accumulations and the future premiums and their accumulations receivable from its policyholders, to meet its future claims as they arise. Since the proper investment of these funds is also essential, this becomes an important part of the investigation, as well as the general manner in which the business has been conducted. Annual statements are required from the companies, embodying the facts essential to such an inquiry, and may be supplemented, if necessary, by a personal examination of the company on the part of the State official. Failure to meet the required test may be followed by a prohibition against additional business until the defect is remedied, or, if actual future insolvency is threatened, by proceedings to close the company. Within the last few years these legal restraints have been greatly increased in many of the States and the companies have been closely restricted as to their forms of contract, expenditures and business systems.

Theory of Life Insurance.— The fundamental problem in life insurance is to find the average premium at each age, which, with its accumulations, will be just sufficient to meet the promised future payment. This is done by first finding the present value of that future payment, or the sum which, invested immediately at compound interest, will, on the average, with its accumulations, meet this payment when due. The probability of death occurring, and consequently the payment becoming due, during any subsequent year is determined from the mortality table. This probability, multiplied by the sum which accumulated to the end of that year would equal the required payment, is the present value of the payment if made that year. The aggregate of such values computed for each successive year of life, is the entire present value of the future payment to which the present value of the premiums to be charged must be equal. These premiums are in effect so many annuities receivable by the company, and their present value is the amount which, at once invested at compound interest, would reproduce them. The problem, therefore, now becomes the determination of the present value of an annuity at any given age. The process is analogous to that already described. The value sought is the aggregate of the amounts which, at compound interest, would provide the annuity at the beginning of each year, multiplied by the probability of the insured being then alive to pay it. Having determined the present value of any given annuity it is easy to find the annuity which has the value required. This annuity is the net premium.

Life Insurance a Science.— This brief explanation will serve to illustrate the general character of the problems involved in the theory of life insurance, many of which are exceedingly complicated and require a knowledge of the theory of compound interest and of the calculus of probabilities, which, when combined, form the mathematical basis of life insurance. The calculus of finite differences has also an important place, and even the infinitesimal calculus has been utilized to advantage,

especially in preparing mortality tables. This whole subject has been developed into a special branch of mathematics termed actuarial science, which has become a recognized profession, whose members, known as actuaries, direct the mathematical computations required for the business. A special class of symbols has been devised in connection with this science, by which the processes involved in its various calculations are readily expressed in the shape of ordinary algebraic formulas. Life insurance computations have been greatly facilitated by an ingenious device known as commutation columns, through the use of which the calculations are much simplified. Published tables of premium and annuity rates and policy values, in connection with the more important benefits, too, relieve much of the office work.

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INSURANCE, LIFE, Statistics. The growth of life insurance and its large place in modern affairs can best be appreciated from a tabulation of the aggregate results since its beginnings in America three-quarters of a century ago. Starting in Great Britain near the opening of the 18th century, the idea took a small hold in the American colonies shortly after the middle of the same century but came to real utility 100 years later, since which time the American business companies and fraternal insurance orders have far outstripped the Old World in their extension of life protection.

The first corporation to attempt life insurance in America, the Presbyterian Ministers' Fund, was chartered in 1759 and is still in flourishing existence. It began on the assessment plan, but changed some years ago to the legal reserve plan. This is not, however, a general business company. Several annuity companies started later, but business insurance took its first earnest start with the Mutual Life Insurance Company of New York, which began operations in 1843. The New England Mutual followed a year later, the Mutual Benefit two years later and the New York Life, also mutual, a few weeks after the last named.

Thereafter the number of companies increased steadily but slowly until the close of the Civil War, when life insurance organization was seized with a speculative craze and companies multiplied rapidly; but the panic of 1872 exposed the weakness of scores that were insecurely founded or poorly managed. The number of companies doing business in New York State rose from 14 in 1859 to 71 in 1870, and fell back to 29 by 1881. The amount of business outstanding decreased about 30 per cent between 1870 and 1881.

The next period of expansion set in with the legislative investigations of 1905. Most of the larger companies have been or have recently become mutual. Many of the newer companies in the southern, central western and far western sections of the United States are capitalized and the total of capital employed rose from $22,724,130 in 1906 in 138 companies to $54,764,732 in 241 companies in 1916; the dividends to stockholders increased from $956,520 to $5,149,076 as between the two dates.

Table I shows that a large proportion of companies existing in 1917 were still young as compared with those that survived the stress of the 70's. A list of 309 American companies that have failed, reinsured or retired is given in the 1917 'Spectator Year Book,' from which the following data are gathered.

TABLE I.—AGE OF EXISTING AMERICAN LIFE INSURANCE COMPANIES TO 1917

DATE OF ORGANIZATION	Number of companies	Years in business
1847 or before	8	70 or over
1857 "	17	60 "
1867 "	29	50 "
1877 "	36	40 "
1887 "	37	30 "
1897 "	41	20 "
1902 "	60	15 "
1905 "	87	12 "
1907 "	114	10 "
1917 "	248	1 "

Table II exhibits the aggregate of results since organization of 194 of the existing life companies and gives the principal items, not including assessment societies or fraternal orders. The showing is impressive from a financial as well as an economic point of view In recent years business assessment societies have greatly declined, while fraternal orders have advanced. Adding the nearly two and a half billion benefits paid out by these societies and orders to the death claims shown in the table, it appears that altogether over six and one-half billion dollars have been paid out to this account during the past 75 years by American corporations. Imagination can hardly exaggerate the economic blessing of this provision to hundreds of thousands of families which would have been left embarrassed otherwise, if not in want.

TABLE II.—AGGREGATE RESULTS OF AMERICAN LIFE INSURANCE COMPANIES FROM ORGANIZATION TO 1 JAN. 1917

	Ordinary	Industrial
Companies included	194	23
Policies issued	25,129,454	119,458,205
Amount issued	$50,372,022,815	$16,470,439,452
Premium receipts	$10,491,426,066	$3,077,502,361
Interest, rents, etc.	3,419,706,328	449,491,110
Total receipts	$13,911,132,394	$3,526,993,471
Death claims	$3,299,977,594	$869,208,184
Endowments, annuities	994,710,950	44,437,317
Purchases, surrenders	1,475,395,177	124,380,618
Dividends	1,419,027,146	156,562,771
Paid policyholders	$7,189,110,867	$1,194,588,890

Table III is designed to exhibit the amazing growth of life insurance within the last 10 years. The pruning resulting from the 1905 investigation made by several State legislatures eliminated the false growth of tontine insurance and brought the business back more largely to its true function of life protection. All forms of endowment policies combine the element of saving with insurance, but the return to a larger use of whole-life policies shown in the table is a good symptom. It appears that, considering business companies alone, the use of life insurance in America nearly doubled in the 10 years exhibited. With

the business of 1917 added, the items for 11 years will show easily twice the amounts of 1906.

TABLE III.—AGGREGATE COMBINED RESULTS OF ORDINARY AND INDUSTRIAL BUSINESS FROM ORGANIZATION TO THE END OF 1906 AND OF 1916

	1906	1916
Companies included	138	241
Capital stock	$22,724,130	$54,764,732
Premium income	$526,594,898	$847,983,760
Interest, rents, etc.	140,590,694	269,876,568
Total income	$667,185,592	$1,117,860,328
Paid policyholders	$287,325,629	$566,386,275
Expenses, etc.	139,535,734	220,013,372
Total outgo	$426,861,363	$792,399,647
Assets — admitted	$2,924,253,848	$5,536,607,483
— not admitted	26,479,236	30,724,057
Liabilities	2,557,049,863	4,966,580,921
Surplus	367,203,985	570,026,562
Insurance in force — Whole life	$7,374,135,263	$13,582,986,343
Insurance in force — Endowment	2,918,489,140	3,914,915,117
Insurance in force — Other	960,569,674	2,370,368,965
Total	$11,253,194,077	$19,868,270,425

Table IV gives the aggregate results for the year 1916 and the financial standing on 1 Jan. 1917, of ordinary, industrial and assessment and fraternal business separately. The item of death claims shows that over $350,000,000 were paid to dependents during 1916, and over $300,000,000 returned to policyholders in one form or another. The other items, particularly the assets, liabilities and surplus, exhibit the strength of the life insurance as an institution. This vast scheme for the protection of human life and its interests is bound to have a tremendously increasing influence. It is something very modern and illustrates better than any other element of progress how modern civilization has broken away from the ancient grip of fate and circumstance and dared to forestall the hazards of life — and to cheat even death of its economic disaster.

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INSURANCE, Marine. Indemnity covering vessels and their cargoes is the most ancient form of insurance, and is found in some form as far back as the records of commerce go. If, as seems probable, the persons of mariners were in some cases also covered, marine insurance originally included all the hazards that are now separated in their wider recognition on sea and land into fire, life and casualty lines.

Marine insurance as now known and practised is a development among Western nations in connection with their commercial activities by sea which had only a limited counterpart among the nations of the East in ancient times. Before the rise of civilization in Italy and Greece, the Phœnicians at the east end of the Mediterranean Sea are found in active trade bearing the products of the continents of Africa and Asia behind them to the seacoast lands of the West as far as the British Isles.

When political and commercial power passed to Asia Minor, to the Ægean Island, to Greece and then to Rome, the same routes of trade persisted, overland from the Orient and by sea to southern and western Europe, and the control of the carriage meant wealth successively to the Greek and the Roman states. After the eclipse of the Roman Empire, trade from the East suffered decline or was diverted to the then flourishing Moslem lands of southwestern Asia and northern Africa. With the reawakening of Europe after the Crusades, the free cities of Italy came to riches and power as intermediaries of trade, but only to decline before the advance in Europe of the Turks, who blocked the ancient caravan routes and thus forced the eyes of mariners westward and brought about the discovery of the American continents. Thus also was sea traffic widened and the centres of trade and wealth shifted step by step from the Mediterranean to Spain and Portugal, the Low Countries and the northwestern coast of Europe.

There is no doubt that water-borne commerce was protected against the "perils of the sea" from very early times, as traces of some form of indemnity are found in the sea regulations of Greece and Rome as well as in the

TABLE IV.—AGGREGATE RESULTS OF AMERICAN LIFE INSURANCE COMPANIES FOR 1916

	Ordinary	Industrial	Assessment and fraternal
Companies included	213	28	603
Policies in force 1 Jan. 1917	10,698,452	35,674,683	9,247,550
Amount in force 1 Jan. 1917	$19,868,270,425	$4,811,041,900	$9,519,372,376
Premium income, 1916	$572,651,985	$275,331,775	$140,585,821
Interest, rents, etc	214,012,103	55,864,465	13,850,894
Total income	$786,664,088	$331,196,240	$154,436,715
Death claims paid, 1916	$179,911,345	$76,499,389	$111,410,432
Endowments	56,779,801	6,753,694	*464,017
Annuities and disability	7,745,828	1,373,584	.....
Purchases, surrenders, lapses	99,740,034	12,296,941	.....
Dividends	100,867,621	24,418,038	.....
Paid policyholders	$445,044,629	$121,341,646	$111,874,449
Expenses, etc	142,857,673	83,155,699	25,417,185
Total outgo	$587,902,302	$204,497,345	$137,291,634
Assets 1 Jan. 1917	$4,328,465,583	$1,238,865,957	$261,188,654
Liabilities	3,821,365,424	1,145,215,497	39,258,394
Surplus	$507,100,159	$93,650,460	$221,930,260

* Sick benefits.

Code of Justinian and in the port ordinances of the Italian free cities. Only in recent centuries has insurance come to such importance as to fall under general public regulations; hence the scarcity of records of the simple business arrangement that sufficed earlier.

In place of the modern policy of insurance on a ship and cargo for a sum paid over by the insured, the ancient practice was more like a silent partnership on the side of the insurer, since, for instance, the Roman patricians who shunned open relations with trade were wont to loan money privately on sea ventures at the good rate of 10 per cent on the condition of repayment if the voyage was safely accomplished, but of no return whatever if ship and cargo were lost. The principal owner, being the mariner, had the larger interest in the success of the venture, and thus the silent partner had a fair chance of profit.

In contrast with this narrow sharing of the hazard, modern marine, like all other insurance, rests on a wide distribution of loss, and the basic premium or cost is determined from the average of loss gathered from experience for each type of vessel and class of voyage and is modified by the immediate considerations and circumstances of the time, such as season of the year and state of war.

For the past 200 years the business of marine insurance has centred in the Lloyds of London, first incorporated in 1871 as an exchange for the regulation of marine underwriting after the manner of other commercial exchanges. As far back as the days of the Commonwealth, seafarers were wont to gather in the coffee houses near the London docks to fraternize and transact their business. One Edward Lloyd kept such a house and shrewdly catered to his clients by affording facilities and supplying intelligence as to shipping and mariners. In the course of time he contrived to have news from all over the world drift his way and then to establish sources of information in all the leading ports.

The first simple plan of Lloyds was for a mariner to post a slip recording his vessel, cargo and prospective voyage, and those who signed up — perhaps to the number of 50 or 100 for £50 and upward, whatever each was willing to assume on the risk — were the underwriters. More than any other branch of insurance, marine business depends on entire honor between all parties and a well-developed judgment as to shipping, trade, times and seasons. Marine underwriting judgment depends fundamentally on marine information, which Lloyds has aimed to supply most completely. Its several publications give particulars as to vessels and mariners and fullest intelligence as to their location and fortunes as they fare over the seas. Business is placed to-day largely by agents or brokers, and as they present their papers an underwriter, representing himself or a company, must be ready at short notice to decide for or against participation. There is no opportunity for particular inspection of risks. The rating of the vessel, according to age and build, and the standing of the owners and the mariner are his main reliance.

Since the first quarter of the 18th century, British joint stock companies have competed with Lloyds and now transact the larger half of the marine business done in Great Britain, and the two together carry the bulk of the world's marine insurance. The stock companies depend on Lloyds for the intelligence essential to their operations. By means of the cables, a great deal of insurance flows into London from all over the world, owing to the advantages possessed and cleverly used by the London underwriters in the way of world-wide banking and trade facilities, as well as marine intelligence. In fact, London marine underwriting has achieved a clear monopoly, so that it can afford to underbid competitors to secure patronage.

American marine insurance began in colonial times with personal, private underwriting at the several Atlantic ports, much on the early plan of Lloyds. Under the rigid laws of the mother country, the larger traffic was confined to English bottoms, which as always loyally carried English insurance, but a lively coastwise and West India trade existed in America up to the Revolution and men of means were to be found in every port able and willing to finance and underwrite adventures on the sea, as such trade was profitable enough to yield an ample return for all concerned.

The War for Independence increased the hazard of traffic by sea sufficiently to cut off the form of private insurance that was in practice, but the opportunities for privateering more than compensated the extra risk for the bolder American mariners. As commerce began to revive under the new national life inspired by the adoption of the Constitution in 1789, the demands of a world trade that opened to American shipping with its unlimited supply of shipbuilding timber, called for an amount of security that could be met only by organized capital. Attempts to copy London Lloyds at several times failed. Our long seaboard, the lack of communication and the separate interests of the States did not afford the unity of action needed to promote success.

Hardly was American marine insurance thus started in a larger way, when the Napoleonic wars worked it disaster. During the winter of 1793–94 about 600 American vessels were seized and detained in British ports, lest our mariners should supply the enemy French with necessities. It took the better part of a year and sometimes years to get news and to make settlements, and the companies waited long years for a settlement of their consequent claims against government. This vexatious state of affairs continued in spite of protest and threat of war and the War of 1812 brought no better security to American shipping. Between 1803 and 1812 nearly 1,600 American vessels were captured by British, French and other European powers.

The American marine made a slow recovery after the settlement of European peace in 1815, but from 1830 to 1860 enjoyed a large growth. This was the era of the clipper ships, when the American sails and sailors outsped all competitors. Vessels left our ports in numbers even for the Far East. Importing firms owned their craft and sent their representatives to dispose of the cargo and to buy for the return trip the silks, tea, coffee, spices and other products of China, Japan and India. The voyage took many months. Insurance rates were necessarily

high, but the business was uniformly placed with American companies and marine business prospered with the prosperity of the importer.

The Civil War demoralized a large American oversea trade and American marine insurance shared the disaster. The national energies were called home and such traffic as still ventured forth was liable to fall victim to Confederate raiders that were fitted out in Europe. While the conflict was on between North and South, the change from wood to iron construction and from sail to steam-power went on apace. When American trade was able to look out again upon the sea, after the close of the war, British shipping everywhere had the advantage in speed and capacity and the Lloyds of London clinched the situation by means of its power to make ratings, to supply quick intelligence and to afford political and financial backing to its clients.

Insurance, like trade, follows the flag. The vicissitudes of the American marine and of American marine insurance may be appreciated from the fact that the registered tonnage increased from 762,838 tons in 1840 to 2,496,894 in 1861, and declined so as to rise only to 888,624 in 1904. Lloyds Register of 1 July 1915 showed that all American vessels, steam and sail, including those of the Great Lakes and the island possessions, numbered 3,249 and the tonnage 5,892,638. This was about 28 per cent of the British, while the British then had one-quarter of the world's shipping and one-third of the world's tonnage.

The superior advantages possessed and used by British marine insurance companies, in conjunction with British shipping and banking, was demonstrated after 1870, when they began to establish American branches. Under our laws they entered the States to do business under easier conditions than domestic companies enjoyed. By vigorous rate cutting the foreigners made such inroads upon the natives that many of the latter were soon compelled to abandon the field. As shown in the accompanying Table I, the 72 native companies doing marine business in 1870 dwindled to 47 by 1880, and during the same period 11 foreign corporations entered the American field. The number of native companies doing marine business had decreased to 20 by 1905, but since then has steadily increased with the increase in importance of American shipping. The number of foreign companies has also steadily increased and they have done and still do not only the larger proportion, but also the more profitable part of American marine insurance. In 1918 New York had 108 fire and marine companies doing marine business.

Marine business cannot be reported fully as considerable American shipping is covered by Lloyds and foreign companies writing directly and therefore making no returns. No complete statistics are available and such returns as exist include inland navigation and certain automobile coverage; still the companies authorized in New York State do the great bulk of American marine business and the showing made in Table I gives a fair idea of the growth and importance of this line of insurance. The years covering the period of the European War reflect the rising shipping values and premium rates occasioned by the commerce raiding of the first year and the submarine warfare of the subsequent years; and reveal also a substantial increase of marine business placed in America. The figures for the Federal war risks on shipping are not available and must be added to exhibit the whole increase.

Table II exhibits the large increase of premium receipts, since the opening of the Great War, of the marine companies authorized in New York, which however do a small amount of inland and motor vehicle business. The amounts should, it is said, be increased by a third for unreported business. During the first two years given the foreign companies did one-third, and during the last two years nearly three-fourths, of the business.

TABLE II.—PREMIUM RECEIPTS OF MARINE COMPANIES AUTHORIZED IN NEW YORK STATE

YEAR	Amount
1914	$38,752,353
1915	53,838,772
1916	76,961,727
1917	119,987,416

As the Civil War threw American ocean trade into European hands, so the World War seems destined to give American shipping an opportunity to recover itself and acquire a proper share of the world's carrying trade. Future American prosperity will depend vitally on commerce, and commerce depends on an intimate alliance of shipping, banking and insurance for the foreign market. Henceforth the world will be organized internationally and America must prepare the instruments for international trade, of which marine insurance is one of the most important, since a foreign monopoly in this can and will inevitably make our ocean shipping and trading unprofitable.

Books are available in libraries to those who wish to learn particulars as to policies

TABLE I.—MARINE AND INLAND NAVIGATION BUSINESS OF ALL INSURANCE COMPANIES AUTHORIZED IN NEW YORK STATE

YEAR	Number of companies: American	Number of companies: Foreign	Risks written	Premiums received	Losses paid
1870	72	.....	$1,330,250,786	$16,300,621	$7,046,097
1880	47	11	1,906,475,177	16,954,195	9,277,853
1890	40	16	2,636,614,231	16,767,993	6,874,333
1900	24	15	5,226,446,147	18,587,451	7,132,179
1905	20	21	5,689,771,934	23,469,212	9,073,592
1910	23	22	12,595,997,689	46,515,014	13,062,156
1911	28	26	13,425,879,616	49,887,214	12,301,865
1912	31	30	15,781,957,187	59,716,335	15,372,153
1913	35	32	16,174,370,673	63,521,450	19,005,239
1914	38	33	16,686,909,623	70,962,392	19,471,413
1915	48	37	21,526,601,714	101,538,966	26,452,956
1916	64	44	31,784,377,087	149,640,212	35,547,118

Table II exhibits the large increase of pre-

and rates, and the intricacies of marine transactions and loss settlements, as also the history of marine insurance development.

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INSURANCE, Old Age. See OLD AGE INSURANCE.

INSURANCE, Science and Economics of. Insurance, to-day, forms an integral element of our social and commercial life. From crude beginnings, the principle of providing, by the contributions of the many to a common fund against the financial consequences of individual losses due to the inherent uncertainties in human affairs, has been perfected until the modern practice of insurance includes all the more important contingencies affecting human welfare. In both science and economics insurance holds a most important position, which becomes more readily apparent as the practice and results of the business are inquired into and considered in their relation to individual and national well-being. As a business insurance holds rank as one of the foremost enterprises of the age, equal in importance to banking and transportation. It would, without exaggerating, be as difficult to think of commerce without insurance as of transportation without railroads or the transmission of intelligence without the telegraph. Modern life has become so completely interwoven with the idea of insurance that there are few contingencies affecting life and property to which the principle of insurance has not been more or less successfully applied.

The scientific basis of insurance is the same in all its branches, that is, the laws of chance and probability. In considering any future event we are confronted by the uncertainty whether such an event will or will not happen, but from the facts of experience upon a large scale it is now possible to calculate with sufficient accuracy the monetary equivalent required to meet the risk assumed by an insurance company. The recognition of insurance as a science dates from 1747, when Corbyn Morris published his classical 'Essay Toward Illustrating the Science of Insurance,' wherein he attempted to "fix by precise calculations several important maxims upon this subject." Accuracy and precision is the essence of all scientific method which in its practical application to insurance does not differ in any important essential from the method which underlies all other scientific processes. The larger the mass of facts considered, the more definite must be the resulting conclusions, which for practical purposes are the equivalent of natural laws and confirmed by subsequent experience verifying the truth of the theory assumed.

Insurance science has thus far found its chief development in the department of life contingencies, due, no doubt, to the fact that the average duration of human life and its pecuniary value require to be determined with the greatest possible accuracy, since the contracts made dependent thereon extend, as a rule, over many years. In other forms of insurance, such as fire, marine and accident, the contracts are generally for short periods, seldom of longer duration than a single year. Hence most of the scientific discussions and the numerous dissertations upon the subject relate chiefly to life contingencies, but there has been a decided improvement in this direction during recent years. The deliberations of associations of actuaries and insurance managers extending over many years, in particular the Institute of Actuaries of Great Britain, are fully entitled to rank, in thoroughness of research and grasp of fundamental principles, with the deliberations of other scientific bodies. It is, no doubt, due to this fact that insurance was included in the most recent classification of the sciences as represented at the International Congress of Arts and Science at Saint Louis, held in connection with the exposition of 1904.

Insurance as a science is a branch of economics, although only a few of the more recent writers on the subject have given careful attention to the theory of risk and insurance in its relation to public welfare. A fairly complete explanation of the economic theory of insurance is to be found in an essay by Allan H. Willett, published by Columbia University in 1901. He holds, and very properly so, that "as a general rule uncertainty exercises a repellent influence in human life, and the existence of risk in an approximate static state causes an economic loss, while (on the other hand) the assumption of risk is a source of gain to society." From this point of view the business of insurance does not differ essentially from general commercial enterprises. Risk is assumed in mining and agriculture in much the same manner as risk is assumed in the business of insurance, but in life insurance, for illustration, the assumption of a risk and the equivalent premium payments required are determined by the theory of probability and the established laws of human mortality and observed experience. In general commercial enterprise the risk assumed is, as a rule, created, while in insurance the risk is pre-existing. This marks the broad division between gambling and insurance. Insurance is not "in the nature of a bet," for in insurance an effort is made to eliminate an existing individual risk by its assumption on the part of the many, while in gambling a non-existing risk is created with resulting uncertainty and needless loss to society.

Insurance companies are chartered institutions with their powers of existence and rights of transacting business derived from the State. They are subject to supervision by special departments in charge of commissioners or superintendents of insurance, who have ample power to inquire into every important detail of office administration. At first the burdens of State supervision were light, since the companies transacted but little business outside of their home State, but within the last generation the business operations of most of the companies have of necessity been extended to other States and Territories. There has, as a result, been developed a vast system of over-supervision, accompanied by an immense amount of over-legislation, much of which is inimical to the highest and broadest development of the business. The position of the commissioner is, as a rule, a political one, subject to the changing fortunes of the parties, and new men have frequently come forward with radical ideas, which, if carried to the extreme, would have

resulted disastrously to the companies and their policyholders. It has been very ably pointed out by Senator John F. Dryden, in an address on 'The Regulation of Insurance by Congress,' that "Insurance is to-day a universal institution reaching all classes and affecting more or less all commercial interests. It is an essential element of human progress and a method and means for the uplifting of the masses to a higher level of economic security. It has become national in character, and few companies confine their operations to a single State; in fact, if operations were so limited they might prove disastrous and make the conduct of the business impossible."

The taxation of insurance is a difficult problem and a matter of serious concern to the companies. In its final analysis the incidence of insurance taxation falls upon the policyholders and the cost of insurance is correspondingly increased. The fact is overlooked that insurance itself is in the nature of a tax and that additional tax burdens are a needless hindrance to the largest development of the business. In 1914 life insurance alone paid in taxes, fees, etc., not far from $16,000,000 and the proportion of taxes to income is constantly increasing, due to additional burdens placed upon the companies as a convenient source of public revenue. A tax upon premiums is an unjust burden upon the business, and is both inexcusable and unscientific. This tax falls alike upon new premiums for risks just incurred and upon renewal premiums upon risks assumed years ago. Since risks assumed years ago were calculated to produce a certain result on the assumption of a known mortality and 4 per cent interest, taxes upon premium payments must necessarily and considerably decrease the returns to participating policyholders, and increase, in consequence, the cost of insurance. If carried to the extreme, especially in the case of companies which issue only non-participating policies, it is possible that the companies may ultimately be unable to meet their obligations in consequence of a policy on the part of the State which is as unwise as it is unnecessary.

Insurance by government is not a new proposition, but it is only during the last half century that there has been an effective effort to establish an insurance department by government in active competition with private companies. In life insurance the experiments of England and New Zealand are the most valuable because the results are, on the whole, fairly comparable with those of non-governmental institutions. Post-office life insurance in England was established in 1864, and the Life Insurance Department of New Zealand in 1869. The former employs no agents or solicitors, while the latter, in all essentials conforms to the methods and usages of private companies. The premium rates and the results to policyholders have been about the same, averaging fairly with those of regular companies of good standing. The business results in England have been insignificant, while in New Zealand a fair measure of success has been achieved. In New Zealand at best and at most, the results have not been better, the cost has not been lower and the security has not been superior to that offered by private institutions, which have increased their business in force at the rate of 82 per cent during the period 1902–12, against an increase of 20 per cent for the government department. The private companies are gradually gaining on the government, and while in 1894 49 per cent of the total policies in force were with the government, in 1912 the proportion was only 34 per cent. To those who believe that the government which governs best is the government which governs least, and that the limit of state duties is unduly enlarged by state trading in such directions as these, the New Zealand experiment is conclusive evidence that government effort in the field of life insurance is not likely to produce results superior to those which have made commercial life insurance the most successful business of the age.

As distinct from voluntary insurance by government or private companies, the so-called system of compulsory insurance for workmen holds a unique and important place in the social economy of certain European nations, particularly Germany. The term compulsory insurance is seriously misleading, for, as a matter of fact, the system is not insurance at all, but a state provision for workmen against the financial consequences of accidents, sickness, invalidity and old age. In its inception the German system of government insurance was a measure designed to counteract the socialistic tendency in opposition to the monarchy. In its development it has been made to include nearly the entire body of workmen and as a theory of government and social reform it has unusual attractions. Critically examined, the system is little else than poor relief under another name, and inadequate in many respects as all methods of compulsory thrift must necessarily be. It is insurance in name, but not in fact, for it is not by the sole contributions of the beneficiaries that the required funds are provided, but by the joint and compulsory payments of employer and employee, plus a state subsidy or grant from the general revenue raised by taxation. The evidence as to the economic and social results of this system is so involved and conflicting and subject to such different interpretations that no final conclusion for or against the system can be advanced at the present time. This much, however, it is safe to say, that the anticipated benefits have not materialized, and the socialistic agitation, although much modified and of a somewhat different character, is to-day more pronounced in Germany than ever before. Nor has compulsory insurance solved the labor problem and brought about a substantial improvement in the relation of capital and labor. The most serious economic aspect is the burden of the system upon German industry and the resulting handicap upon competition in international trade. In the opinion of Professor Farnam of Yale, an impartial student of the subject, "the supporters of the German system are claiming for it more than the facts of the case as they now stand warrant," and that "The German experience with this kind of insurance seems to show that, while it is possible with a highly trained intelligent administration to carry through a scheme which will compel provision against various contingencies, it has thus far been impossible to create the instinct of forethought and care which is implied where insurance is voluntary. There are many facts which go to create a strong presumption that the result of this governmental care is actually to make people less careful of

the future, and less judicious in their expenditure."

Insurance had its origin in private enterprise and it has attained its commanding position as a world force for the betterment of the social condition of mankind through the initiative, ability and courage of a group of men as much deserving of immortal fame and glory as any other class of benefactors of the human race. State trading in the field of insurance has never advanced the cause by a single important innovation or by a new theory or by a material improvement in practice. The necessary reforms and changes as dictated by experience have been brought about by the companies and it is due to these and these alone that the insurance business has become one of colossal magnitude and world-wide extent.

The World's Insurance Congress of 1915, held in San Francisco in connection with the Panama-Pacific International Exposition, proved a memorable event in the annals of insurance in all its branches, and foreshadowed broader national and international conceptions of the business which now ranks foremost among the institutions making for human betterment. The essential facts and phases of insurance as a social and economic institution were presented by eminent members of the insurance profession. Among the addresses were "The Service Performed by Fire Insurance Companies," "The Force of Insurance in Social Economy," "Insurance and Conservation of Human Life."

No other business so completely enjoys public confidence and has so successfully stood the test of long experience. As the scientific principles of insurance are examined and the highly specialized administration of the companies is considered and the results are measured by a fair standard of benefits in proportion to cost, the verdict of science and economics will agree with that of the mass of mankind that our social and commercial progress would have been impossible without insurance. Resting upon this broad foundation of human experience and public confidence, the colossal business of modern insurance challenges the admiration of the world.

Bibliography.— Insurance has a literature of its own and a most interesting history extending over more than four centuries, with suggestions of at least a conception of the insurance idea among the most ancient people of whom there is a recorded history. The limitations of this article preclude more than a brief reference to the more recently published works, among which may be mentioned Willett, 'Economic Theory of Risk and Insurance' (New York 1901); the 'Yale Insurance Lectures' (2 vols., New York 1904); Alexander, 'The Life Insurance Company' (New York 1905); Young, 'Insurance' (London); Dean, 'Fire Rating as a Science' (Chicago 1901); Phelps, 'History of American Insurance During the Last Decade' (*American Underwriter,* New York 1904); Vance, 'Handbook of the Law of Insurance' (Saint Paul, Minn., 1904); Wolfe, 'Investments of Insurance Companies' (New York 1905); Hoffman, 'Insurance Science and Economics' (New York 1911); Dunham, 'The Business of Insurance' (New York.1912). These are but a few of the many books on insurance which have been published during recent years. In addition there are the insurance yearbooks on life, fire and miscellaneous insurance, the annual reports of insurance commissioners, some of which contain critical observations on insurance problems of the day, the annual proceedings of underwriters' associations, and the national conventions of insurance commissioners, the special publications of insurance companies, their histories, etc., the discussions on State supervision and Federal regulation of insurance, of which the two more important are an address by John F. Dryden, president of the Prudential Insurance Company of America (1904), and a report of the Committee of the American Bar Association on Insurance, by Ralph W. Breckenridge, chairman, Omaha, Neb. (1905). But the chief source of information regarding insurance practice, the progress of the business, the organization of companies, etc., is to be found in the technical and general insurance periodicals, the *Insurance Monitor, The Spectator,* the *Weekly Underwriter* and the *Insurance Press* of New York, the *Baltimore Underwriter,* of Baltimore, the *Standard,* of Boston, the *Economic World,* New York, and many others.

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INSURANCE, Social. See SOCIAL INSURANCE.

INSURANCE, Workmen's. See WORKMEN'S COMPENSATION.

INSURANCE LAW. A body of statutes controlling the business of insurance has grown with the growth of insurance in modern times in all civilized lands. As an element of trade, insurance necessarily came under certain regulations from its earliest use, and with its expansion from local to national and international proportions and from almost private utility to a general social and commercial necessity, public control has increased to cover almost every detail of the business.

The insurance of vessels and their cargoes at sea was the earliest line to attain importance, and the practice of individual owners sharing losses seems to have been an ancient one. Naturally certain customs and ordinances covering these transactions came first to be recognized and established at the larger seaports. Before the fall of Constantinople in 1453, the world-trade routes lay east and west from the great seaports of the Mediterranean Sea,— Florence, Venice and Genoa. The traffic east was by land, and west by sea. When the conquering Turks shut off the overland traffic east, it became necessary to search out another route, with the resulting discovery of the way around the southern point of Africa by the Portuguese and of a new western world by Columbus. The seaports of Portugal, Spain and the Netherlands now became busy distributing centres of trade from the Far East and West to north and and central Europe. The longer sea voyages made desirable a better security against loss, and this involved more government regulation.

In the 14th century, when trade flourished at the ports of Italy, of the Spanish Peninsula and at Bruges in Flanders, the practice of sharing losses among the interested individual owners called forth simple ordinances to de-

fine the practice and to outline the necessary agreement or policy form. In more recent times the trade centres of Europe have drifted largely to northern Europe, but in the London Lloyds is found the ancient practice of individuals, under certain regulations, underwriting sea risks to the largest amounts. Since the opening of the 19th century, however, there have come into being corporations which underwrite marine contracts as a business venture on the basis of average loss, such as now underlies all other forms of insurance, and both the world's increasing need and the formation of purely business companies to meet the need for the protection of water-borne commerce have made necessary a larger public control of marine insurance.

In America a similar development occurred to that in the Old World. As the sea trade of the northern-eastern Atlantic ports sprang up, during the later colonial period, interested individuals shared the risk of the traffic as interinsurers, until at length the expanding need of the independent States of the Union called for the larger service of capitalized companies, through which the business of insurance was more and more brought into the purview of law.

Meantime the demand arose also for other forms of protection,—insurance against the hazard of fire, and death, and more recently against sickness, accident and the numerous other hazards commonly grouped as casualty insurance. The great London fire of 1666 emphasized the necessity for insurance against fire and shortly after the beginnings of fire insurance the first forms of modern life insurance began to appear.

In each case, individual sharing of losses, or the principle of mutuality, was brought into use, but eventually each line has come to extensive application under organizations of joint-stock corporations, although in America life insurance is transacted mostly by companies without capital stock. Public regulation was at first concerned with the term of the contract, called a policy, but with the expansion of the service came the necessity for securing the integrity of the corporate insurer by regulations covering the investment of its funds and providing for an adequate reserve against future obligations.

The first legal restraint, under British regulation, was one designed to check a tendency to gamble on marine risks, resulting in the establishment of the principle of insurable interest. Experience and study combined to furnish a scientific foundation for insurance during the 18th and 19th centuries in the matter of adequate premiums and reserves, and during the latter century the competition of numerous small companies tended to develop business and to find new fields for its application, so that to-day insurance enters every part of our commercial and social structure.

When the business of insurance was largely local, public opinion influenced its control, but with the later growth of companies extending their operations over wide areas, it became necessary to define closely by statute all the conditions, in order to secure equitable treatment to the insured and to conserve the funds necessary to meet future obligations. As the result of public control this far, there has emerged a decided tendency to uniform standards, methods and requirements that may in the end develop a uniform code of insurance in the United States, where now 52 diverse local codes have often hampered the transaction of interstate insurance by varied and conflicting or duplicative requirements.

The present State laws covering the essentials of insurance organization, methods of business and standards of solvency have, under the pressure of business demand, become so much the same that a development toward Federal control of interstate insurance would naturally follow an acceptance of such insurance as an element or instrument of commerce. This is asserted by insurance leaders to be in line of progress and would open the way for a Federal code that would serve as a model to all the States and Territories.

The entry into the United States of a large number of foreign companies, during recent years, will likewise tend to bring interstate insurance under national control. At the present time nearly 100 such corporations are doing business in New York. Matters relating to American companies abroad and to national supervision found place in President Cleveland's second and third messages, and in President Roosevelt's fourth and fifth messages. Shortly after the declaration of war against Germany in 1917 the Federal government took charge of the business of all enemy corporations in the United States.

American laws recognize uniformly the practice of rigid separation of fire, or combined fire and marine, from life, health and accident insurance, and both from the general casualty lines, and require separate organizations for their transaction, herein differing from practice in Europe, where several lines may be covered by one company, though usually with a separation of funds.

CHARLES MAAR.

INSURANCE PATROL, also known as fire patrol, protective department and salvage corps, is an organization now existing in all the larger cities under the support and control of local boards of underwriters but closely associated with fire departments, with the object of protecting property from theft and damage during a fire. They operate mostly in business districts and are now generally equipped with high power motors carrying fire extinguishers and waterproof coverings, the latter to be used to protect merchandise and furniture in cases where removal may be impossible or unnecessary.

This service has grown from small beginnings and has been the means of largely reducing losses for the supporting companies. In New York city, as early as 1835, the associated fire companies employed four men at the yearly salary of $250 each. This city's force now consists of nearly 200, divided into seven companies. The Chicago patrol has a chemical engine and eight companies. Boston began in 1849 with six oiled covers and now has three well-equipped companies.

A valuable incidental service is performed by the patrols in investigating the origin of fires and their reports afford an accurate basis for underwriting statistics. In 1892 a national association of superintendents and captains was formed to promote friendly relations and

gather statistics. Yearly conventions have since been held.

CHARLES MAAR.

INSURANCE SUPERVISION. While insurance was mostly concerned with marine risks little public regulation was required, as each transaction was completed in the course of a few months, or about a year at most, and the practice of interinsurance between owners required no accumulation of funds. With the advent of fire insurance after the Great London conflagation of 1666 and the beginnings of life insurance a generation later, the conditions of insurance as a business became more complex and the accumulation and security of funds necessary. All insurance is based on average loss as shown by experience, but a policy of fire or life insurance may remain in force for a series of years. Public supervision has concerned itself, on the one hand, with the terms of the policy contract to secure fairness and equity, and, on the other hand, with the business integrity of the insurer; and the intimate oversight of all forms of insurance is justified by the fact — not at first realized, but now universally admitted — that the insurer acts in a fiduciary capacity toward the multitude of its policyholders.

In recent years, with the application of insurance to a multitude of business relations, covering many hazards of persons and property, it has come to pass that the world's commerce and trade and the welfare of society depend vitally on insurance as an arch depends on its keystone. A truly tremendous responsibility, therefore, has come to rest upon supervisory officials.

Owing to the local nature of early insurance and the provision for local incorporation when corporate insurance began, State supervision came into being. Before the middle of the 19th century the interests involved called for little more than a yearly financial statement, but by the end of this period an era of rapid growth and vigorous speculation in insurance as a business set in. The increasing interests and erratic tendencies combined to demand closer and more special public inspection. A department of insurance was created in Massachusetts in 1855 and under the direction of Elizur Wright, a genius in insurance science, developed great efficiency and set high standards. The same can be said of the New York department, organized in 1860 under the guidance of William Barnes, Sr. Connecticut and Indiana established insurance departments in 1865, California in 1868 and Missouri in 1869. Gradually all the States have assumed a measure of supervision over the insurance business within their separate borders, in some cases at the hands of one of the regular State officials, but most generally by means of a specially appointed superintendent or commissioner.

Although the insurance business in all lines has long since become national and even international in its scope, supervision has remained localized in the States under the influence of a number of decisions of the United States Supreme Court adverse to insurance being an element or instrument of commerce, which precludes Federal oversight. The first case bearing on this point, Paul vs. Virginia, was decided in 1868. Classes of fire, life, accident and health companies or societies doing a local business must necessarily remain under State supervision, but there is no longer room to doubt that the corporations doing interstate business could be much more economically and efficiently supervised by the national government. To accomplish this desideratum in the face of the decisions mentioned, an amendment to the national Constitution is necessary.

The possibility of conflicting authority among the 52 insurance departments in the United States has been obviated to a large degree by the influence of the older States in establishing methods and standards and also by the yearly conference of officials which began in 1870 in the National Convention of Insurance Commissioners. This body has been the means of unifying opinion and of securing the adoption of uniform financial statement blanks and standard policy forms or conditions, as also uniform laws covering certain phases of insurance, such as fraternal orders, casualty reserves and standards of solvency. It is perhaps too much to hope for a uniform insurance code as the final outcome, but some degree of Federal supervision is a near possibility and this will produce an immense saving of expense by eliminating the varied and duplicative requirements of the local authorities on interstate insurance.

The cost of supervision is made a charge upon insurance companies in the form of fees and taxes, which have come so far to exceed expense requirements as to constitute a substantial source of State revenue. This charge ultimately falls upon the policyholders and is criticised as a tax on thrift. The contention that insurance of every form is such a social and economic necessity as to deserve encouragement, rather than made a source of revenue, would appear just.

CHARLES MAAR.

INSURANCE TAX, a levy under the War Revenue Law which became effective 1 Nov. 1917, whereby individuals or corporations issuing insurance policies are required to pay within the first 15 days of each month on (a) life insurance, except reinsurance, eight cents per $100 of policy; (b) life insurance policies of $500 or less issued on weekly payment plan, 40 per cent of the first weekly premium; (c) fire, casualty, liability and all other insurance and renewals, except reinsurance, one cent on each $1 of premium. For general taxation of insurance, see INSURANCE, SCIENCE AND ECONOMICS OF.

INSURANCE TERMS in general use in the transaction of life and marine insurance business:

ABANDONMENT.— A term used in marine insurance to denote that all property saved has been relinquished to the underwriters in order that the insured may claim indemnification for a total loss.

ABORDAGE.— A term used in marine insurance. If a collision between two vessels happens on the open sea and the damaged ship was insured the persons insuring her must pay the loss, although they are entitled to relief at civil law against the party causing the damage.

ACCEPTANCE.— A term usually used, in marine insurance, in cases of abandonment. It is this process which perfects the rights of the insured in the recovery of his loss.

ACTUARY.— An officer of an insurance company whose skill in the application of the doctrine of chance to financial affairs enables him to make the computations necessary to determine the valuation of contingent liabilities, as shown in the compilation of tables, the computation of risks, etc.

AGREEMENT.— In insurance the contract issued prior to the delivery of the official policy is known as the "agreement."

ANNUITY.— A fixed amount paid each year, whether in one sum, or periodically, in instalments. When an annuity is continued for a specific number of years it is termed a "certain" annuity. If the period of its continuance is uncertain it is called a "contingent" annuity. When payment has already commenced it is an "annuity in possession," but when such payment does not begin until a specified period has elapsed, or a definite event has taken place it becomes known as a "reversionary" or "deferred" annuity.

ASSESSMENT.— In insurance, an assessment is made (1) as an apportionment in general average upon the articles at risk for contribution for damage and sacrifices purposely made for escape from impending peril, and (2) also upon premium notes given by members of mutual companies as a substitute for the investment of the paid-up stock.

AVERAGE BOND.— A bond in marine insurance under which the consignees of cargo subject to general average guarantee payment of their contribution as soon as ascertained in order that their goods may be delivered at once.

BARRATRY.—In marine insurance, the commission of any fraudulent act in the management of a ship, or its cargo, by which the owners, consignors or insurers are subject to injury.

CASUALTY.— A term frequently used in insurance as a synonym for accident.

COINSURANCE.— A form of insurance in which the insured, in view of a reduced rate of premium, agrees to maintain insurance upon a certain specified percentage of the total value of his property, failing which he becomes his own insurer for the difference, a fact which makes him jointly responsible with the assuring company in case of partial loss.

CONSTRUCTIVE TOTAL LOSS.— A term used in marine insurance when the thing insured and damaged, while not entirely a total loss, is so nearly so that it is practically beyond recovery or repair. In such cases a notice of abandonment is served upon the insurers by the owners, after which the "constructive total loss" may be recovered.

DECREMENT.— A term used in insurance, usually in the sense of the "equal decrement of life," or the doctrine of annuities upon which assurance companies base their existence. It is the theory that in a given number of lives there should be an equal number of deaths within a given period.

DEFERRED INSURANCE.— A form in which the liability of the company does not begin until a certain specified date in the future.

DEVIATION.— A term used in marine insurance to denote the voluntary departure of a vessel, without necessity or reasonable cause, from the usual course of the voyage for which she was insured. All unreasonable delays are also involved in the same law, which releases the underwriter from all risks.

DOUBLE INSURANCE.— A term used among insurance companies as a synonym for over-insurance. Thus, where divers insurances are made upon the same interests against the same risks in favor of the same assured, in proportions exceeding the value of the subject, the party insured may sue upon all the policies although he is entitled to but one satisfaction.

ENDOWMENT.— A term used in life insurance to describe a policy in which the face value, with accrued earnings, is payable to the insured at, or after a stated period, or in which the face of the policy is paid to his representatives should he die prior to the expiration of that time.

FLOATING POLICY.— In marine insurance a policy covering certain interests wherever located, even in vessels unknown to the insured or the insurer.

GRAVEYARD INSURANCE.— A term used to designate a method of swindling insurance companies by the substitution of a person of robust health for the bad risk actually insured. Also used to describe other kinds of insurance swindling, or crimes committed in the collection of insurance moneys.

INSURABLE INTEREST.— It is essential to the insurance contract that the insured should have a legal interest in the object for which the insurance was taken. In France the laws annul all policies that exceed the insurable interest of the assured at the time of the subscription.

INSURANCE.— A term used to describe a contract whereby for an agreed premium one party undertakes to compensate another party for loss in a specified subject by specified perils. There are several kinds of insurance companies in operation, but nearly all are either "stock" or "mutual" companies, while the risks covered include, life, accident, fire, health, marine, burglary, live-stock, plate-glass, etc.

JOINT-LIFE POLICY.— A policy issued to husband and wife payable to the survivor upon the death of either. The husband is required to show that he has an insurable interest in the life of the wife. This policy is of special utility in cases where either husband or wife possesses a life interest in property or funds.

LOSS, AMOUNT OF.— An insurance term denoting the diminution or destruction of the values of, or of the charge upon, the insured by the direct consequence of the operation of the risk incurred, according to its value in the policy. See TOTAL LOSS.

OPEN POLICY.— In insurance, a policy in which the value of the subject insured has not been fixed, but has been left to be determined in case of loss, or because it has been left open to permit of the addition of other things whenever occasion demands.

PARTNERSHIP POLICY.— One issued to a firm in which each of the partners is insured for the amount of his capital which is thus safeguarded for the use of the firm in case of the death of the insured.

SURRENDER.— A term in insurance to denote that the party insured has abandoned all right in his policy in consideration of having received a portion of the premiums already paid to the company. The percentage of premiums returned is known as the "surrender value" of the policy.

TERM INSURANCE.— That issued for a given period to cover a particular or extra risk.

TIME POLICY.— A form of marine insurance covering vessel or cargo, or both, for a specified time only.

TONTINE POLICY.— In insurance, a policy in which the insured agrees that no money shall be received by him from the insuring party, either in the form of dividends, return-premiums, or surrender-value, for a specified term of years, but that, instead, the entire surplus shall be permitted to accumulate until the end of that period when it may be divided between those who have kept their policy in force.

TOTAL LOSS.— In marine insurance, total loss may mean that the subject insured has been absolutely destroyed by the peril against which it was protected, or it may mean that the loss by damage, seizure or other causes has been so great as to be practically absolute. In the latter case it is often termed a "constructive total loss."

VALUED POLICY.— A term used in insurance to show that a policy is one in which the value has already been set upon the subject insured, the insertion of which fact in the policy, with the amount agreed upon, makes proof of damages in case of loss unnecessary.

VOYAGE INSURANCE.— That covering goods or vessel only during the specified voyage from one designated port to another.

WAGER POLICY.— In insurance, a policy in which the insured has no insurable interest, and, being generally regarded as a form of gambling, such policies are not valid except in places where the validity of a wager may be recognized.

INSURRECTION, the act of rising against governmental authorities, active opposition to the power of the State. In the United States, power to suppress insurrections by employing the militia is given to Congress by the Constitution, Art. I, Sec. 8, Clause 15. In 1792 and 1807 acts were passed giving the President power to call forth the militia when notified by an associate justice of the Supreme Court or a district judge that the execution of the laws is obstructed, and on application of a legislature or a governor, when the legislature could not be convened, and to employ also the land and naval forces of the United States. The Whisky Insurrection (q.v.) was directed against the Federal authority and the President employed force to suppress it on notification by the Federal judge. During the Buckshot War (q.v.), in 1838, between the Whigs and Democrats in Pennsylvania, the governor of that State asked for assistance, but it was refused. The governor of Rhode Island made a similar application during the Dorr Rebellion (q.v.) and the regulars were held ready for action, but their aid proved unnecessary. These last two cases came under Art. IV, Sec. 4, of the Federal Constitution, which provides "that the United States shall protect" each State on application of the legislature, or of the executive, against domestic violence.

When the Civil War began the President was obliged to take prompt steps in calling out the militia, though no application had been made to him as required by the acts of 1792 and 1795. His action was justified by Art. II, Sec. 3, of the Constitution, providing that "he shall take care that the laws be faithfully executed," but Congress on 6 Aug. 1861 formally validated

and made legal all of President Lincoln's previous acts, proclamations and orders. The Force Bill (q.v.) of 20 April 1871 gave the President special power to use military force in certain contingencies. In the South during the reconstruction period, and in the North, during strike riots, Federal troops have been used.

INTAGLIO, a method of cutting a stone or gem by which the design is cut or hollowed out — not raised, as in a cameo. In art, the term means the opposite of relief, denoting the representation of a subject by hollowing out a gem or other substance; so that an impression from the engraving has the appearance of a bas-relief. Intaglio letters have been effectively used in printing in recent years, and much of the effectiveness of colored printing is due in large measure to a process or processes closely akin to intaglio.

INTEGRAL CALCULUS, a branch of infinitesimal calculus, treating of the methods of deducing relations between *finite* values of variables from given relations between contemporaneous infinitesimal elements of those variables. It is thus the inverse of the differential calculus. Its object is to discover the primitive function from which a given differential coefficient has been derived. This primitive function is called the integral of the proposed differential coefficient, and is obtained by the application of the different principles established in finding differential coefficients and by various transformations. To illustrate—with the integral calculus one may discover the relations connecting finite values of variables, as x and y, from the relation connecting their differentials, as dx and dy. Integral calculus is thus the doctrine of the limit of the sum of infinitesimals of which the number increases, while the magnitude decreases, both without limit, yet according to some law. The more proper concern of the integral calculus is besides the finding and discussion of integrals, with such matters as the theory of spherical harmonics, the theory of residuation, and parts of the theory of functions. The sign of integration is "f," which is a form derived from the old or long "s." It is the initial of the word "sum," and came into use owing to the conception that integration is the process of summing an infinite series of infinitesimals. Before even the notation of the differential calculus and its rules were discovered by Gottfried Wilhelm von Leibnitz (1646–1716), he had invented the notation and had found some of the rules of the integral calculus. Leibnitz first used the now well-known sign "f" or long "s" as short for the "sum of" when considering the sum of an infinity of infinitesimals as is done in the method of indivisibles. Leibnitz himself attributed all his mathematical discoveries to his improvements in notation; and the fact that we still use and appreciate Leibnitz's "f" (and one must add his "d") even though our views as to the principles are very different from those of his school, is perhaps the best testimony to the question of notation. The integral calculus may be distinguished from the differential calculus by another feature than inversion; namely, by the greater importance in it of imaginaries. The integral calculus is frequently called the indirect or inverse method of fluxions, the analytic processes by which a function may be found such that being differentiated it shall produce the given differential. By writers on "fluxions" this function is called the "fluent" or the flowing quantity. By writers on the infinitesimal calculus it is called the integral of the proposed differential. The origin and constitution of quantities is called "fluxions" in the scheme of Sir Isaac Newton (1642–1727), because conceived to express the manner of generation of quantities by the motion of other quantities. In the scheme of Leibnitz the language employed is "infinitesimals" or "differences"; because they are conceived to express the constant addition of one indefinitely small quantity to another. In the scheme of Newton, or "fluxions," the finding of the sum of all differences is called the "inverse" or the "indirect method." It is thus that this method of obtaining the quantity generated is identical with the method of finding the "fluents." And this same method in the language of Leibnitz is called "integration" or the finding of the "integrals." The two systems are therefore in no respect whatever different except in their origin and in their language; their rules, principles, applications and results are for all practical purposes the same. In Newton's system an "f" or f is used to express the "fluent."

To find the integral of a differential is to integrate that differential, and this process by which this integral is found is called integration. With the integral calculus a mathematician endeavors to transform the given expressions into others which are differentials of known functions, and thus deduce formulas which may be applied to all similar forms. The number of such formulas is said to be unlimited. The collection of Meyer Hirsch is a well arranged and though originally published long ago at Berlin is still useful.

Sir Isaac Newton (1642–1727) undoubtedly arrived at the principles and practice of a method equivalent to the infinitesimal calculus generally much earlier than Leibnitz, and, like Roberval, his conceptions were obtained from the dynamics of Galileo. He considered curves to be described by moving points. An "arc" thus became the "fluent" of the velocity of the point with which it is supposed to be described. Newton's notation (it must be admitted) for the "inverse method of fluxions" was far clumsier, even, and far inferior to Leibnitz's "f," the long "s." And it was owing to the long acrimonious dispute between Newton and Leibnitz, mixed up with insinuations anent what is sometimes mistakenly called "patriotism," that for considerably more than a century British mathematicians failed to perceive the great superiority of the "notation" of Leibnitz. In fact it was not until the beginning of the 19th century that there was formed, at Cambridge, a society to introduce and spread the use of Leibnitz's notation among British mathematicians.

"It may be said" (we quote Sophus Lie) "that the conceptions of differential quotient and *integral,* which in their origin certainly go back to Archimedes, were introduced into modern science by the investigations of Kepler, Descartes, Cavalieri, Fermat and Wallace. . . . The capital discovery that differentiation and integration are *inverse* operations belongs to Newton and Leibnitz" (in *Leipziger Berichte* XLVII, 1895, Math.-phys. Classe, p. 53). And

indeed in the opinion of one who has contributed much to the advancement of American mathematics as well as of Britain (indeed, of the world!), J. J. Sylvester, "it seems to be expected of every pilgrim up the slopes of the mathematical Parnassus, that he will at some point or other of his journey sit down and invent a definite integral or two toward the increase of the common stock." (See CALCULUS, INFINITESIMAL and consult his 'Notes to the Meditation of Poncelet's Theorem,' Mathematical Papers, Vol II, p. 214). Consult also Archimedes of Syracuse 'On Method'; with an introduction by David Eugene Smith and an English translation by Lydia G. Robinson (Chicago); Cavalieri, 'Geometria Indivisibilium' (1635); Cheyne, 'Fluxionum Methodus Inversa' (1703); Condorcet, 'Du Calcul Integral' (1765); Craig, 'De Calculo Fluentium' (1718); Descartes, 'Letters,' 'Geometry,' etc. (1637); Euler, 'Institutiones Calculi Integralis' (3 vols., Saint Petersburg 1768-70); Fermat, 'Opera Varia Mathematica' (1679); Hymer's 'Intégral Calculus' (1844); Johnson's, W. W., 'Elementary Treatise on the Integral Calculus'; and his larger work 'Integral Calculus' (2 vols. in one: New York 1915); Kepler, 'Nova Stereometria Doliorum Vinariorum' (1615); La Place, 'L'Usage du Calcul aux différénces partielles,' Mén. de l'Acad. (1777); Leibnitz, 'Quadrature of the Circle' (in Leips. Acts and Phil. Trans., 1682); id., 'Nova Methodus pro maximis et minimis itemque tangentibus' (in Leips. Acts, 1684); id., 'Correspondence with Newton'; Mascheroni, 'Annotationes ad Cal. Integ. Euleri' (1790); Monge, 'Sur le Calcul Integral des equat. aux dif. partielles,' Mem. de l'Acad. (1784); Newton, 'De Analysi per Æquationes numero terminorum Infinitas' (circulated in MS. in 1669, and printed in 'Commercium Epistolicum,' 1712; it is also contained in a volume edited by W. Jones, entitled 'Analysis per Quantitum Series, Fluxiones ac Differentias,' 1723); Newton, 'Principia' (esp. lib. ii, sect. iii, lemma 2; 1687); id., 'Tractatus de Quadratura Curvarum' (published with 'Optics,' 1704); id., 'The Method of Fluxions' (1736); Price's 'Infinitesimal Calculus' (2 vols., 1854); Picard, Emile, 'Traité d'analyse' (4 vols., 1891); perhaps the most extensive and one of the most advanced treatises that has as yet appeared; Roberval, 'Traité des Indivisibles,' Mem. de l'Acad. des Sciences (1666); Todhunter, Isaac, 'A Treatise on the Integral Calculus' (Cambridge 1868); Wallis, 'Arithmetica Infinitorum' (1655).

INTEGRAL EQUATIONS. An integral equation is an equation connecting two variables, an independent variable x, and a dependent variable u, in which u occurs (in at least one term) under the sign of integration. An example of such an equation is

$$(1)\quad f(x) = g(x)u(x) + \int_a^b K(x, t)u(t)\,dt,$$

in which $f(x)$ and $g(x)$ are given functions of x, $K(x, t)$ is a given function of x and t, and a, b are known functions of x, one or both of which may be constant. The above equation is called *linear*, since u enters to the first degree only. It is *homogeneous* when $f(x)$ is identically zero. It is the most general form of linear equation. The fundamental problem connected with eq. (1) is to solve it for the unknown u; that is, to express u as a known function of x.

The theory of integral equations is the most recent development of importance in the domain of pure mathematics. The foundation for a general theory of such equations was laid by Volterra in several papers published in Italian scientific journals in 1896. Since then this new field has developed with great rapidity and already has an extensive literature. In spite of this rapid growth the magnitude and difficulties of the problem in its general form are such that only the simplest cases have been worked out with any degree of completeness. These cases group themselves under the following four types:

I. Volterra's equation of the 1st kind:

$$f(x) = \int_0^x K(x, t)u(t)\,dt;$$

II. Volterra's equation of the 2d kind:

$$f(x) = u(x) + \lambda\int_0^x K(x, t)u(t)\,dt;$$

III. Fredholm's equation of the 1st kind:

$$f(x) = \int_0^1 K(x, t)u(t)\,dt;$$

IV. Fredholm's equation of the 2d kind:

$$f(x) = u(x) + \lambda\int_0^1 K(x, t)u(t)\,dt.$$

The function $K(x, t)$ is called the *kernel* of the given equation (It., nucleo; Fr., noyau; Ger., Kern); λ is an arbitrary constant.

These types include the equations that naturally present themselves in connection with other branches of mathematics or in the solution of physical problems. It was, in fact, from such sources that integral equations began to claim the attention of mathematicians and to press for a systematic investigation. The first attempt to solve an integral equation occurs in a memoir by Abel, published in 1823 in connection with the following mechanical problem: To determine the arc of a curve situated in a vertical plane such that a heavy particle starting at rest from the highest point P of the arc and moving by the attraction of gravity along the curve to its lowest point O, shall make the descent in a time $f(h)$ which is required to be a given function of the vertical altitude h between O and P. This problem leads to the integral equation

$$\sqrt{2g}\,f(h) = \int_0^h \frac{u(y)\,dy}{\sqrt{h-y}}$$

in which $2g$ is the acceleration due to gravity, approximately 32, and $u(y)$ is the unknown function $\sqrt{1+\left(\frac{dx}{dy}\right)^2}$, x and y being the rectangular coördinates of a variable point on the required curve. It will be observed that Abel's equation is of Type I, with $K(h, y) = \frac{1}{\sqrt{h-y}}$. Abel found the solution of this equation to be

$$u(y) = \frac{\sqrt{2g}}{\pi}\frac{d}{dy}\int_0^y \frac{f(h)\,dh}{\sqrt{y-h}}.$$

The simplest case is that in which $f(h)$ is constant. This is the celebrated problem of the tautochrone, which may be stated as follows: To find an arc of a curve such that a heavy particle descending along it under the action of gravity shall arrive at the lowest point in the same time, from whatever point of the curve the point begins to fall. The above solution readily leads, in this case, to an inverted cycloid with its vertex at the lowest point.

Abel was the first to perceive the essential character of integral equations and to make some effort to develop a method for their solution. He applied his ideas to the more general equation

$$f(x) = \int_0^x \frac{u(t)\,dt}{(x-t)^a} \quad , \quad 0 < a < 1 \ ,$$

for which he obtained a solution by the aid of infinite series. This method is not regarded, however, as satisfactory and cannot therefore be considered as affording a basis for a general theory. In the interval between Abel's first paper and Volterra's fundamental work, several writers had occasion to solve integral equations in connection with problems of mathematical physics. In particular, Lionville (1832), who was the next after Abel to consider this subject, and who apparently was unaware of the work of his predecessor, was led to Abel's equation in connection with various physical problems. He introduced the method of successive substitutions which has recently been made applicable to much more difficult equations. The first attempt to solve an equation of the Fredholm type was made by Neumann (1877) in his celebrated method for the solution of Dirichlet's problem. This consists in developing $u(x)$ in increasing powers of λ. But Neumann's development, while converging in the case of Dirichlet's problem, does not converge in the general case. Neumann's method was applied with success, however, by Volterra to the general equation of Type II. In a brilliant memoir published by the Swedish mathematician, Fredholm, in 1903, a general method for solving equations of types III and IV was given, thus completing, at least in outline, the theory for linear equations.

While integral equations have found their greatest usefulness in the field of applied mathematics, they are of importance also in connection with other lines of pure mathematics, such as Theory of Functions, Calculus of Variations and Differential Equations. In the first of these, mention has already been made of the fundamental problem of Dirichlet: To determine the values of a harmonic function within a region bounded by a closed curve, given the value of the function at every point of the boundary. It is with differential equations, however, that this subject has the closest contact. In many cases a single integral equation is the equivalent of a differential equation together with certain auxiliary equations of condition. Lionville, in 1837, solved a differential equation by means of an integral equation in order to express the desired solution in the form of a series which should converge with sufficient rapidity. In dealing with equations containing more than one independent variable, the integral equation has this advantage over the corresponding partial differential equation, in that the extension from one variable to several variables offers no appreciable increase in difficulty in the former case, while the difficulty is seriously augmented in the latter case. There has also been developed a theory of integro-differential equations which involve not only the unknown function $u(x)$ but its derivatives as well. These are likewise of importance in physical problems.

For a detailed exposition of the theory of integral equations, the reader is referred to the following admirable works: 'An Introduction to the Study of Integral Equations,' by Bôcher (Cambridge 1909); 'Leçons sur les équations intégrales et les équations intégro-différentiélles,' by Volterra (Paris 1913); 'Elementi della teoria delle equazioni integrali lineari,' by Vivanti (Milan 1916).

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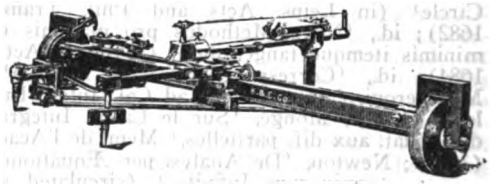
INTEGRAPHS. See INTEGRATORS.

INTEGRATORS and **INTEGRAPHS,** instruments for ascertaining the area and moments relative to any axis of any figure by tracing its outline. They facilitate finding displacement, moments of stability and inertia, centre of gravity, etc., of ships; the tensile strength, resistance and safe load of beams, girders, cables and the contents of embankments, cuts, etc. The



Mechanical Integraph.

integraph plots the integral curves as the operator traces the outline of the figure. The value of the ordinate of this curve can be measured off on paper or read on a finely graduated bar. This value multiplied by the constant of the instrument gives the area of the figure. By tracing the new curve in the manner that the outline of the figure was traced the integral curve of the next higher order is drawn by the instrument, the ordinate of which, multiplied by the constant gives the moment of the original diagram. By repeating the operation the moment of inertia and moments of the 4th, 5th, etc., order can be found. This instrument is of great value in shipbuilding and various kinds of construction.

INTEGUMENT. See SKIN.

INTELLECT, in philosophy and in psychology, the thinking principle of a mental constitution. The word is derived from the Latin *intellectus,* discernment by the senses, from *intellegere* or *intelligere; intellectus — a,— um* is derived from *inter* between and *legere* to gather, or to collect, or to choose; and thus conveys the general idea of "that which has power to choose between." In modern psychology intellect is the designation of the whole cognitive power as distinguished from feeling, sensation, volition and conation. See PSYCHOLOGY.

INTELLECTUALISM, in philosophy, theories which emphasize the intellect as con-

trasted with the affective and volitional aspects of consciousness. In philosophy it applies, for example, to Herbart's doctrine of presentations, in which cognitive experiences are made primary in the explanation of mind. The historical antithesis between sensation and intellect gives the term intellectualism to theories which find the ultimate nature of reality in some form of thought or reason. By some reality is reduced to intellectual relations. In æsthetics the view of intellectualism regards the ideas suggested by an object as the important factors in beauty. Recent philosophic thought, however, is departing from the crass intellectualism of even a few years ago. Bergson is the greatest figure who has opposed intellectualism in our day.

INTELLIGENCE. See INTELLECT.

INTELLIGENCE IN ANIMALS. See ANIMAL, MIND IN THE BRUTE.

INTENSITY OF SENSATION. Every sensation has at least four attributes: Quality, clearness, duration and intensity. No one of these can be further defined than to say it is an aspect of immediate experience. By intensity of sensation, therefore, is meant that aspect of experience which, for example, we ascribe to tones as loud or faint, to colors as bright or dull, to pressures as heavy or light, to tastes and smells as strong or weak. It is important to distinguish between intensity of a sensation and intensity of stimulus. The latter is physical, and is always measurable by some physical unit; the physical intensity of tones, for example, may be measured by amount of physical energy, weights by number of grams or ounces, lights by so much candle power, etc.

Intensity of sensation is partially conditioned upon intensity of stimulus. There are stimuli, however, which do not give rise to sensation; some tones are too faint to be heard, some weights too light to be felt, some solutions too weak to arouse taste, etc. We have then, as a first problem, to determine the intensity of stimulus which will just produce a sensation. Such a determination, to be valid, must be made under rigorously controlled conditions; the possibilities of error on the part of the observer are so numerous that the same type of methodical procedure is as necessary for its determination as for the just noticeable difference. (See DISCRIMINATION, SENSIBLE). The magnitude representing the stimulus which just arouses a sensation is known as the stimulus-limen, or RL. This may be defined as that stimulus which, in 50 per cent of a large number of observations, is reported as "present," while in the remaining 50 per cent it is reported as "not present." It is a calculated value; and like the DL, it is an ideal, a most probable value.

We may, nevertheless, think of the RL as a point somewhere on the scale of stimulus-intensity. The lower limit of this scale is zero intensity and it is, therefore, below the RL; the upper limit is infinity, since theoretically we may gradually increase the energy of a tonal vibration, add candle power to candle power, pile gram upon gram without end. The intensity of sensation which corresponds to the RL is, on the other hand, the zero point of the scale of sensation-intensities; theoretically, the upper limit of this scale is again infinity; but practically it is subject to the capacity of the sense-organ.

We have seen that the unit of the stimulus scale is some physical unit like the gram or candle-power. What now is the unit of the sensation scale? The answer to this question is fundamental to the larger problem of mental measurement. Until the middle of the last century philosophers had said that mental measurement was impossible because there was no unit of measurement in terms of sensation itself. Nevertheless, the astronomers had already divided the stars into six magnitudes, and it has since been found that the difference in intensity between a star of the first and one of the second magnitude is approximately equal to that between stars of the second and third, third and fourth, fourth and fifth and fifth and sixth. Each magnitude is, then, a point on a scale, the points are equi-distant as measured by differences in intensity, and the difference between any two continguous points may be taken as the unit of the scale. We may say, therefore, that the difference between stars of the first and sixth magnitude is five times the difference between the first and second magnitudes. Such a unit, which we may call a supra-liminal difference, is, of course, an arbitrary one, but it has proved to be adequate to the measurement of intensity in nearly if not all sense departments. A unit which gives less direct measurements but which has a greater range of applicability, because its magnitude is expressed in terms of the stimulus, is the just noticeable difference or the DL. We cannot assume off hand, to be sure, that all least differences are equal, that least steps at various parts of the scale are equal steps, but the experimental evidence is, on the whole, favorable to this assumption.

What now, it may be asked, is the relation between the two scales, the one of stimulus differences, the other of intensity differences? Do equal differences in intensity of sensation correspond with equal differences of intensity of stimulus? In seeking the answer to this problem we may employ either of our two units of sensation. We have only to determine the physical intensity of every point on the supra-liminal scale, and then see whether the physical differences are or are not equal to the sensation differences; or, employing the other unit, to take a number of DL's from some portion of the scale and then compare the differences between their magnitudes. Since these magnitudes are expressed in terms of the stimulus, the relation of their differences will furnish an immediate answer to our question.

We find, whichever unit we employ, that the two scales do not correspond point for point, that equal differences in intensity of sensation correspond rather with *relatively* equal differences in the intensity of stimulus. Let us suppose, for example, that the points on the sensation scale form an arithmetical series like 1, 2, 3, 4, etc., then the points on the stimulus scale to which these will correspond will form a geometrical series like 2, 4, 8, 16, etc., or like 3, 9, 27, 81, etc.; the exponent of the geometrical series varies with the sense department — for noise it is 4/3, for light 101/100. This law, which is known as Weber's Law (q.v.), explains many phenomena of everyday life which, however, are so common that they often fail to excite our notice. The relation of black print to the white page seems always the same, yet

the intensity of sunlight changes with every hour of the day; the painter is able to simulate a natural scene, yet he cannot begin to reproduce the actual intensities of light and shadow by means of his pigments; the same musical composition may be rendered by orchestra and again by piano without loss of dynamic effect, yet the intensity of the former is much greater than that of the piano. All these result from the fact that the sense impressions depend not upon their absolute but upon their relative likeness. Consult Delboeuf, J., 'Éléments de psychophysique' (Paris 1883); Ebbinghaus, H., 'Grundzüge der Psychologie' (Leipzig 1905); Fechner, G. T., 'Elemente der Psychophysik' (Leipzig 1899); Külpe, O., 'Outlines of Psychology' (New York 1910); Myers, C. S., 'Textbook of Experimental Psychology (London 1910); Nagel, W., 'Handbuch der Physiologie des Menschen, III' (Braunschweig 1905); Titchener, E. B., 'Experimental Psychology, II' (New York 1905); 'Textbook of Psychology' (New York 1910); Wundt, W., 'Grundzüge der physiologischen Psychologie' (Leipzig 1908).

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INTENT, Common, a law term: in the rules of legal construction, the natural sense given to words. It is the rule that when words are used which will bear a natural sense and an artificial one, or one to be made out by argument or inference, the natural sense shall prevail. It is simply the rule of construction and not of addition. Common intent cannot add to a sentence words which have been omitted. (2 H. Blackst. 530). In pleading, certainty is required; but certainty to a common intent is sufficient; that is to say, what upon reasonable construction may be called certain, without recurring to possible facts. (Co. Litt. 203-a, Dougl. 163).

INTENT, INTENTION or **INTENDMENT,** in criminal law and in the law of evidence: the purpose; formulated design; a resolve to do or forbear a particular act; aim; determination; end; object,—which a person may have. It is not synonymous with motive, attempt, or, as some think, with promise. In its literal sense, the stretching of the mind or will toward a particular object.

To render an act criminal or wrongful, intent must exist. And with this intent must be combined a wrongful act, mere intent is not punishable. And generally, perhaps always, intent and act must concur in point of time. But wrongful intent may render criminal an act otherwise lawful.

Intent is in a certain sense essential to the commission of a crime, and in some classes of cases it is necessary to show moral turpitude, but there is a class of cases where purposely doing a thing prohibited by statute may amount to an offense though the act does not involve moral wrong. When shippers pay a rate when under honest belief that it is the lawful rate when it is not, we have an instance of this.

Some jurists incline to a somewhat Jameslike (see INTENT in psychology) interpretation of Intent, even in law. Intent "is the exercise of intelligent will, the mind being fully aware of the nature and consequences of the act which is about to be done, and with such knowledge, and with full liberty of action, willing and electing to do it." Among such interpretations see Burrills (Circ. Ev. 284, and notes). To accept this method, however, appears to mean the acceptance of "Intent" in what at the beginning of this article is called the "literal sense" rather than the "legal."

A wrong done to the person or property of another is punishable at law without consideration of the intentions of the person committing the violence or trespass. But when an engagement has been made by person, or a written disposition of property executed, the intention of the person making the engagement or signing the deed is fair matter for legal inquiry. In this connection a subsequent stipulation by word of mouth is not competent to nullify or modify the terms of a written engagement. Intent also forms an important part in suits for defamation, fraud and negligence. Negligence must have intent to make it criminal, so must defamation and fraud and malicious mischief. Consult Thayer, 'Preliminary Treatise on Evidence' (1898); Black, 'Construction and Interpretation of Laws' (1896); Hardcastle, 'Rules which govern the Construction and Effect of Statutory Law' (1900).

INTENT, or **INTENT OF CONSCIOUSNESS,** in psychology is virtually identical with the goal of conscious endeavor at a specific moment in time. In German the word *meinen* is probably the nearest equivalent to our word Intent, though either *Sagenwollen,* or the phrase *in Sinne haben* might answer the purpose equally as well. French psychology employs "intention"; Italian, "intento." Modern English "Intent" may also be compared with M.E. the Fr. and O.F. "entent," attention, purpose. All these words, except those of German psychology mentioned above, are in ultimate origin from the Latin word "intentum," or "intensum," the past participle of the Latin verb "intendere," meaning "to intend," "to extend," "to stretch out."

The psychologist James employs "intent" in a manner peculiar to his system of psychology, to designate what intelligent consciousness "means or intends." As stated it is not usually employed in this sense by psychologists. Its usual sense is implied in the definition given at the beginning of this article, and this is a sense which marks a certain point of view from which one may regard an "object." It is almost a law, that in any conscious process having unity of interest there must also exist a corresponding unity of object. This is shown by Baldwin. Exceptions are rather apparent than real. Partial presentations, of course, come before consciousness as appearances, but as appearances, always of one and the same total object, which consciousness is endeavoring to know in its completeness. If our interest be merely attainment of knowledge, fuller, more definite, or more vivid, the object, as it becomes more perfectly known, is identical with the object as previously less perfectly known. For it is, says Baldwin, what the mind consciously means or intends. While one's attention is constantly employed upon an object, the end pursued becomes progressively defined in the process of its achievement. And in so far as such an object remains indefinite, or partially developed in consciousness, it is an intent. The result of a

concrete mental determination, that state in which any specific process in consciousness issues and completes itself, is known as "End-state" (the German *Enzu-stand*, the French *etat final*, and the Italian *stato finale*).

Bradley employs "content" in a sense analogous to that in which intent is understood under the definition of it given at the head of this article. Content in this sense, however, is peculiar to Bradley. For as ordinarily applied, content (of consciousness) means all special modifications of conscious experience, whatever may be their nature, and not merely objects of consciousness. Pleasure or pain are thus part of the content of consciousness, but neither are always an object or an intent of consciousness.

Intent is the consciousness, obiterdicta, of the general nature of the end-state, and is mental progress toward an ideal we have successive stages of intent.

INTERCALARY ("called or proclaimed between"), the day added to February in leap-year, also the month or days occasionally inserted in the calendar to make it correspond with the solar year. In botany, the term is applied to the growth of the cell-wall when a new deposition takes place in such a manner that an interposed piece of cell-wall from time to time appears. See CALENDAR.

INTERCESSION, Doctrine of, a theological tenet founded on the Scriptural representation of Christ, who having made the redemption an accomplished fact on earth ascended to plead with his heavenly Father for the sinners redeemed by the shedding of His blood. We are not to suppose that God needs to be interceded with in the sense that he is reluctant to pardon sinners, or that he becomes more disposed to do so through the pleading of Christ. Since it is evident from the whole tenor of the New Testament, as well as from a multitude of special passages, that the sacrifice of Christ on Calvary for the reconciling of sinners unto God was itself the offering of God's own love to the world (John iii, 16–17), we must regard the intercessory work of Christ rather as illustrating the eternal holiness of God and the changeless love of the Saviour, and as intended to keep continually in view the sacrifice of atoning grace whose tender mercy it develops. This doctrine is common alike to Catholics and Protestants. Catholics, however, believe that the Blessed Virgin and the saints intercede indirectly through the Saviour, who alone has the ear of the King of the universe. Mohammed is regarded as a powerful intercessor by his followers.

INTERCHANGEABLE PARTS, of industrial or military implements, are the key to all the vast expansion of modern manufacturing. Without these, only a small fraction of it, and consequently of new population human or animal, agriculture, engineering and industrial civilization in general, could have come into being. A glance at its implications will show that this seemingly extravagant proposition is sober fact.

The principle of interchangeability affects production in two ways: through the original manufacturing, and through repairing. In manufacture it makes possible the turning out, in separate departments, in vast masses at full speed, in exact shape for immediate assembling, of all the individual parts used in great numbers in complicated machines, from the screws of a watch to the rivets of a giant steamship. Without this, the different parts would require an army of fitters to make them work with each other, and indefinitely more time for assembling, hence a much diminished production and higher expense. In repair, if every replaced part of a watch or sewing-machine, a gun or a reaper, had to be individually filed or hammered or reforged into adjustment, the delay and expense would greatly decrease the articles' use and the work done by their means; and for military service, repair would involve so much remanufacturing on the field as to make modern warfare quite impracticable. Now, reflecting that the multiplication of men is conditioned by that of goods and employment, of food by farms and transportation, of the latter by engineering, and so on, the conclusion above is easily substantiated.

Owing to mechanical niceties to be explained later, the principle did not attain much close accuracy in use till toward the middle of the last century; and as might be expected, was first developed in making firearms, where masses of lives were involved and the highest of stakes to be won. The Springfield, Mass., armory was the first to bring it to a high grade of embodiment. Somewhat later, the Waltham Watch Company applied it, under much more difficult conditions, to the minute, sometimes almost microscopic, parts of its watches. The constant effort of all large implement manufacturing for many years has been toward perfecting its application; and its success largely gauges the increased use of machinery in place of men, and of mechanical utilities.

The first requisite is obviously that each part shall come within very small limits of variation, neither stick nor "shuck"; the one stopping or slacking movement and increasing frictional wear and heat, the other making movement ineffective and irregular and breakages likely. Or if, say, a fuse, its cavity must hold pretty closely the same amount of explosive to determine time and goal. Hence the standards of accuracy and craftsmanship must be kept very high; in the long run it is most economical if worth attempting at all. Any saving on expense by slighting severe requirements is more than sunk on increased cost in assembling, to say nothing of rejected work and impaired reputation.

While every step must help to ensure this uniformity, it must be frankly accepted that there is a certainty of some error in each; and the proper course is not to attempt eliminating it wholly—an impossible task, and beyond a certain limit costing more than it is worth,—but to determine the limits up to which it is neglectible, and hold it within them. Constant accurate measurement for those limits is therefore the basic need; and the limits themselves depend on the class of work and closeness of adjustment required. Thus, if a piece is to be one inch in a given dimension, with an ordinary steel scale we are sure of it within about 1/100 inch; with a micrometer, about 1/4000; on a measuring machine, about 1/100,000. The latter is not available in most small establishments; and when the standard of accuracy must be held high, the best means of

guarding against discrepancies from independent measurements is by the establishment of a model. All measurements are then comparative instead of direct, and correct within much smaller limits of error. If this be neglected, its lack will be a constant hindrance to the high standard requisite in all the better classes of implements; and no other system so economical and reliable has yet been devised within the general reach. An example is the 36-inch bronze bar in government archives as a legal standard of length. Drawings of each part for general shop reference should also be provided, with all dimensions and tolerances clearly shown.

Next must be established the allowable deviations from the model. These are controlled mainly by two factors: first, the proper functioning of the whole,—thus the largest shaft must always assemble into the smallest bearing; second, how small a variation can be maintained in manufacture. This done, means of testing the accordance of the parts with these standards must be furnished; namely, gauges representing the largest and smallest permissible size for each important dimension. An inspection organization should be carefully trained to use these, and throw out any piece not conforming to them, to save further labor on it or mischief in assembling, and prevent more of its sort being made. Such a service can retrench much useless expense; in fact, if in any large plant it does not save far more than its cost in a year, something is very wrong.

But further uniformities than size, which gauges and drawings concern solely, are called for. Physical characteristics must conform also. This is effected by specifications dealing itemwise with strength, hardness and finish, composition of materials, and vital points to be watched most closely in course of making; and prescribing both frequency of tests (enough to establish sure accuracy) and manner of manufacture, also in detail any special treatment contingently called for, as heat treatment of steel.

Equipment to obtain results simply and inexpensively is a business necessity. It must be carefully suited to the special requirements of the product, as a type of appliance very satisfactory in one class of manufacturing may be quite unfit for another.

These steps are indispensable for interchangeability. The model should remain fixed till a new or improved design is devised. The tolerances are subject to some experimental change, but should be put on a fixed basis at the earliest feasible moment; and never altered to suit inaccuracies in manufacturing methods or other temporary convenience, as the ultimate loss outweighs the saving. The specifications of course change with new methods or materials. All these are so essentially interwoven that slighting any one makes the rest unsure, and every change should be carefully considered as to affecting the whole system. A well-balanced whole will give far more efficient results than one with some elements much in advance of the others.

The Model.— This affords for all dimensions a direct comparison against a physical standard, the most uniform method available with the usual measuring equipment. The whole object will be to reproduce it in quantity as closely as possible, and such reproduction should be carefully kept in mind in developing it. To aid in this, no operations on it should be performed by hand tools (as a file), because such cuts are hardest and costliest to reproduce. All cuts should be machining cuts.

But its development consists of far more than merely producing a piece of work as a standard for other production. Every cut taken should be governed, where possible, by some profile plate, size block, angle plate, form tool or master plate that will be available later for construction of the manufacturing equipment. This will eliminate much of the necessity for several independent settings to reproduce the same sizes or shapes, ensure much greater uniformity throughout, and in the long run prove a real economy. Every step must be considered as to how it affects not only the model itself, but the reproduction of these same sizes, profiles and locations in the working tools and equipment.

To make the model, as often done, an independent unit merely for comparison of measurements, is a wasteful economy far overbalanced by increased expense of making the necessary tools. The more intricate the model, the greater the economy in liberal use of master plates, templets and all other useful special equipment. It should be very carefully kept, not handled or hit, and used only in cases of question and for verifying tools and gauges as needed. It must not be confused with the experimental models; the work is assumed to be past the experimental stage. This ultimate standard is in a class by itself, and must be done by skilled craftsmen of the highest type. At present the manufacturers of firearms are the leaders in this branch.

The Tolerances, or Allowed Variations. — Several factors are involved in establishing these. First, they must never be so great as to injure the operation of the mechanism; yet since expense of manufacturing increases very fast with severity of requirements, economy demands as large a tolerance as consistent with proper functioning. Second, those on one piece must not overlap the sizes fixed for companion parts. The extreme sizes must be compared with each other; so that, for example, the largest pin will always enter the smallest hole, the smallest never be too loose in the largest hole. Third, it must always be kept in mind that the only dimension on any part controllable within close limits is the distance between where it is supported and the surface being machined by the cutting tool. Thus the method of holding the work determines the correct locations of the dimensions; or, vice-versa, those locations determine the holding points for machining. Fourth, the accuracy of the machining facilities available determine the actual possibilities of closeness, and hence should be carefully considered in the original design. The actual extent of tolerances will be a matter of experiment or experience. The same care should be exercised, and the same factors considered, in altering a tolerance as in establishing it.

The Drawings.— These have been used since very early times, and in many cases today are the only standards; models not being in universal use. Even with models, they are

always an invaluable aid for shop reference; while since the invention of cheap duplicating processes such as blue-prints, photostats, etc., their frequent use is actively encouraged. They mostly show each part in detail, give all required dimensions and usually the tolerances. Great care must be exercised in placing the dimensions on them. These should be shown between the points intended to hold certain relations to each other. In no case should the location of any point be given with limits from more than one point in the same straight line; otherwise the tolerances will be misleading, as it is impossible to control the variation between more than two such points at once. Wherever possible, a working point or surface should be established in each plane, and all points located from this only; much expense and confusion will be eliminated. Whenever the drawing itself does not give sufficient information, notes should be added.

The Gauges are measuring instruments of fixed dimensions; and where tolerances are established, show two sizes, maximum and minimum, differing by the smallest amount attainable in practice. For example, the gauge for the size of a hole would consist of two cylinders, the smaller just entering the hole and the larger not. The wear on gauges is considerable, and they should be frequently and carefully inspected; preferably by comparison of measurements with a duplicate set of master gauges, themselves carefully checked against the model, and standards of the allowable variations from it. Their design depends upon their purpose. Wherever possible, they should admit of ready repair or correction. It is often possible so to construct them that the parts which control the gauging sizes will receive no wear, thus keeping the maintenance cost very low and insuring the duplication of the original sizes.

Owing to the inevitable factor of error above noted, it is impossible to make any two gauges exactly alike; and to make them within 1/100,000 inch of each other would cost a hundred times as much as within 1/10,000. With this variation, however slight, and with work going through several successive inspections, much difficulty will be met unless proper precautions are taken. No matter how closely several sets of gauges are made to each other, after very short use a variation develops, due to difference in amount of wear and in methods of handling them. When working to gauges, the work will always follow the gauges. The setting of a tool is not changed, a tap or a reamer is not replaced, as long as the work passes the gauges used. So if they wear excessively and are not set right, the work gets farther and farther away from its original standard, and discovery is perhaps made by loss and discredit. The following practice, if strictly adhered to, will almost eliminate these difficulties, and reduce the entire problem to whether the combination of operator, machine and tools is suitable to produce duplicate work:

First, a set of master gauges, duplicates to the working gauges, and checked closely to whatever standard is used. These must under no circumstances be employed to gauge a piece of work; only as standards to check the working gauges.

Second, a positive limit of error for gauges, governed by the tolerance on the given part and the cost of the gauge; all to be inside the total tolerance allowed on the part. For example, a maximum plug gauge could be smaller but never larger than the master, a minimum larger but never smaller.

Third, the sets of gauges should be sorted into groups, according to requirements of inspection. Assuming a shop inspection and a final inspection, three groups would be needed; one for the operators, one for shop inspectors, one for final inspectors. Again assuming that the final inspectors will use two sets constantly, the shop inspectors three, and the operators four, nine sets will be in use at the same time. All gauges should be graded according to size; the two of each type closest to the masters will be sent to the final inspectors; the next three, varying a little more inside the limits, to the shop inspectors; the last four, with the greatest but still allowable variation, to the operators. Each operator should hold his work to the gauges furnished him, regardless of any variance from those of other operators.

Fourth, all gauges in use should be checked periodically against the masters, and discarded, repaired, or regraded according to condition, regardless of which job they were returned from. The frequency of this will be determined by practice, as a capable gauge man will soon determine how many pieces a gauge will measure in given hands without losing its size. Some can be used only on a few hundred pieces before wearing appreciably, others will measure several thousand. Work manufactured continuously needs a duplicate outfit. All gauges of any one type, or the duplicates of any one master, to be used during the same period, should be checked at the same time, to permit of proper grading and comparison.

Fifth, all persons who use the gauges should be carefully instructed and trained in their use. A gauge is an expensive and comparatively delicate instrument, and a careless operator can spoil one on the first piece he gauges; or a foreman with one in his drawer can ruin it by knocking around or mishandling. The final inspectors should set the standard of handling and use, and instruct all others as far as possible to use them likewise.

Work must be held to slightly closer tolerances than the maximum allowable, since it is impossible to work to a maximum without sometimes exceeding it; so the operator has the gauges allowing the smallest working tolerances, as his normally receive the greatest amount of wear.

The Specifications.— Only on very simple or familiar mechanisms do the drawings, gauges, etc., give sufficient information for intelligent manufacture. Specifications should form an integral part of the equipment. As said above, they should explain clearly and definitely the requirements and desired results, character and composition of materials, the chief functioning points and sizes, class of workmanship demanded, and any unusual manufacturing methods required; with the character and method of inspection. In fact, any information of value in the process should find here a permanent record. If any requirements are unimportant, and economy is the main factor, that fact should be stated also. These specifications may be incorporated on the

drawings, if desirable and they are simple; otherwise be kept as an independent record, and revised to keep abreast of current practice. They are as yet a rarity in general establishments, but their value and help are becoming more widely acknowledged. The best examples are in government supplies, as munitions.

The Manufacturing Equipment consists of the tools, jigs, fixtures and machines required. A jig or fixture is a device for holding a piece in proper position while some machining operation is performed upon it. Each operation usually needs a special jig. Its general type or design depends entirely upon the part to be wrought. One factor, however, remains constant, and must always be kept in mind for satisfactory results; the locating points for any operation should always be those from which the machined surface is dimensioned. A strict observance of this fundamental principle will eliminate many manufacturing difficulties.

If a model has been suitably developed, many size blocks, master plates and other valuable accessories will be available, that will not only ensure greater accuracy in the equipment and a corresponding uniformity in the product, but greatly decreased expense in equipment costs. In any event, if a model is available, all equipment should be carefully tested to it before being forwarded to the production departments.

The Production, a general mechanical business, need not be dealt with here; the next step is

The Inspection.— This department has the responsibility, and should have the power, of maintaining the standards of accuracy and quality. It should be entirely independent of the production department, whose duties are incompatible with its own, and too often held and performed as hostile. It must be provided with all needful testing and checking apparatus; and its duty is to see that all work is up to the mark before passing from machine to machine, or department to department. Its detailed duties depend upon the nature of the product; but in any case its personnel should be individuals of good judgment, intimately acquainted with the requirements, and well trained in the use of the testing facilities.

The Assembling furnishes final proof whether due attention has been paid to the factors of size; unhappily, the test for quality of material mostly lies in use, and detection of neglect comes too late. If the parts may be assembled without fitting or further machining, and the mechanism performs its functions properly, it is conclusive evidence that the dimensions have been kept true. On the other hand, if fitting or other modifications are necessary, it is equally conclusive proof that some vital factor has been overlooked, and investigation to locate and correct the trouble should follow. In truly interchangeable work, no machining will be performed in the assembling room.

Interchangeable manufacturing requires many types of skilled workmen. As operations are simplified, the needed skill becomes less; but a corresponding increase is required in preparation work and supervision. The basic principles remain fixed, but their application must be modified to suit particular factors of product, class of equipment available and type of workmen employed.

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INTERCOASTAL, or INTRACOASTAL, CANAL, The, of Louisiana and Texas, a government project in process of construction for the purpose of providing an inland waterway around the coast of those States, and connecting the Mississippi River with the Rio Grande. An act of Congress of 3 March 1873 ordered a survey with a view to connecting the Mississippi River with the Rio Grande by cuts and canals, joining the lakes, bays, bayous and lagunas along the margin of the Gulf of Mexico. No action was taken on the report by Congress at that time. The project was revived by Texas and Louisiana interests and a new survey was authorized by the act of 3 March 1905 and the examination from the Mississippi River at Donaldsonville, La., to the Rio Grande was made by Maj. Edgar Jadwin, of the United States Engineers. Subsequently the Donaldsonville exit was changed to Plaquemine by reason of the locks at that place. The Mississippi-Rio Grande waterway is divided by the United States Engineers into sections as follows — each section being considered as a distinct project: Mississippi River to Bayou Teche, Bayou Teche to Mermentau River, Mermentau River to Sabine River, Port Arthur, Tex., to Galveston Bay, Galveston to Brazos River, Brazos River to Pass Cavallo, Pass Cavallo to Aransas Pass, Aransas Pass to Brazos Santiago, Brazos Santiago to the Rio Grande. The section between the Mississippi River and the Sabine River embraces practically all of southern Louisiana and lies well within the region of alluvial deposit made by the Mississippi River. It consists of wide areas of marsh, numerous cypress swamps and many lakes which are from one-half to 30 miles in length. Many bayous, having a general north and south direction, intersect and these bayous are all deep, most of them having 20 to 30 feet for miles in succession. There are no elevations, thus making it possible to construct a tide-level canal across the entire section. Although the bayous are deep, the bays and lakes are usually shallow, ranging from 6 to 12 feet in depth. From the Sabine River to the Rio Grande the route follows mainly the lagunas, or bays, lying behind the islands which parallel the Texas mainland. The canal passes through the cypress, salt, sugar, rice, oil and pine sections of Louisiana and serves the great sulphur mines of Louisiana as well as those of Texas at Freeport. These two mines, the Louisiana deposit being found at Sulphur in Calcasieu Parish, furnish practically the entire supply of sulphur to the United States. The status of the canal is as follows: Mississippi River to Mermentau River completed with a ruling depth of five feet, reached either through the locks on the Mississippi River at Plaquemine, La., to the Atchafalaya River, or through one of the privately owned canals opposite New Orleans. Mermentau River to Sabine River, work in progress; depth, Mermentau-Calcasieu stretch, seven feet; Calcasieu-Sabine, 12 feet. Sabine River to Port Arthur and Port Sabine, 25 feet. Sabine to Galveston, approved on a depth of

nine feet. Galveston to Corpus Christi, completed on five foot depth. Corpus Christi to Brazos Santiago, not yet undertaken. Brazos Santiago to the Rio Grande at Brownsville, Tex., work in progress. The five foot depth has a bottom width of 40 feet; the seven foot depth a bottom width of 75 feet and the 9 and 12 foot depths have a bottom width of 100 feet.

With the completion of the canal all the markets of the Mississippi and its navigable tributaries can be reached safely and cheaply, and the communication afforded opens to the Mississippi River more than 1,000 miles of the navigable rivers of Louisiana and Texas. The commercial need of the waterway has been well established; its military value is obvious.

In the marsh areas of southern Louisiana are many so-called islands which are fertile strips of higher land in the marsh; these are served by the waterway and railroad construction is impractical. The best proof of the need and practicability of the canal is found in the fact that many private canals exist and are extensively used, serving a triple purpose — transportation, irrigation and reclamation. The last feature has been greatly stimulated by the intercoastal canal, and in southern Louisiana there are more than 50 extensive reclamation districts embracing a total area of over 300,000 acres. The appropriations made by the United States thus far are in excess of $2,000,000. It is estimated that $10,000,000 more will be required to complete the work. In some sections of Louisiana the local community has contributed to the cost and in all sections the rights-of-way, 300 feet in width, are furnished without cost to the United States.

INTERCOLLEGIATE ATHLETICS. See EDUCATIONAL ATHLETICS.

INTERCOLONIAL CONTROVERSIES. See BOUNDARIES OF THE UNITED STATES.

INTERCOLONIAL RAILWAY. This railway and the Prince Edward Island Railway are owned and operated by the government of Canada as part of the government railways. They are under the charge of the Department of Railways and Canals, which is presided over by the Minister of Railways and Canals, who is a cabinet minister. The intercolonial extends through the provinces of Quebec, New Brunswick and Nova Scotia, connecting the cities of Montreal and Quebec with the cities of Saint John, Halifax and Sidney on the Atlantic Coast. Its length, including branches, is 1,562 miles.

The history of the Intercolonial is interesting, but there is space here for only a brief out line. The construction of a railway from the Atlantic Ocean to the Saint Lawrence River at Quebec, through the British provinces, was proposed in 1832. An exploratory survey from Point Levis, opposite Quebec, to Saint Andrews on the Bay of Fundy, was made, with the assistance of the British government, in 1836, and a practicable route was found, but nothing further was done at that time because of representations from the United States government that part of the surveys were in territory claimed by the State of Maine. Other explorations were subsequently made until 1846, when the Royal Engineers, under instructions from the British government, commenced the survey of several routes from Halifax to Quebec. These surveys were completed in 1848, and the route recommended by the engineers was, generally speaking, that adopted when the Intercolonial was constructed many years afterward. The surveys showed that there were several routes by which such a railway could be constructed, but the provinces considered that the work was too great and costly for their unaided resources; under these circumstances the greater project was laid aside for a time and each of the provinces in its own way, and independently of the others, turned its attention to the construction of railways which were destined afterward to form parts of the Intercolonial.

The province of Canada in 1849 passed an act affording assistance to railway companies by guaranteeing their bonds, and the Halifax and Quebec Railway was particularly mentioned in this act. In 1852 the Grand Trunk Railway Company was incorporated and subsidized. Another company was also incorporated and subsidized, in the same year, to build a railway from opposite Quebec to Trois Pistoles. This company was amalgamated with the Grand Trunk Railway Company, and the latter built the line from Point Levis, opposite Quebec, to Rivière du Loup, 126 miles, which was opened in 1860. The company did not build as far eastward as Trois Pistoles.

The province of New Brunswick in 1853 also commenced railway construction, and built, as a government work, a line from Saint John to Point du Chene on the Gulf of Saint Lawrence, 108 miles. It was opened in 1860, and was called the European and North American Railway. In 1865 the province entered into a contract for an extension of this railway eastward to the boundary of Nova Scotia, and this was completed and opened in December 1870.

The province of Nova Scotia commenced in June 1854 the construction of a government railway, and in December 1858 it was opened from Halifax to Truro, 61 miles, with a branch to Windsor, 32 miles. It was called the Nova Scotia Railway. The province afterward extended this railway from Truro to Pictou on the Gulf of Saint Lawrence, 52 miles, this extension being opened in May 1867.

The people still desired complete railway communication between the provinces, and in 1864 and 1865 a survey was made of a route to connect Truro, Nova Scotia, with Rivière du Loup, Quebec, the link which remained to be constructed.

On 1 July 1867 the provinces of Canada, Nova Scotia and New Brunswick were, by an act of the Parliament of Great Britain, united in a confederation called the Dominion of Canada. By that act the railways already mentioned, owned by the provinces of Nova Scotia and New Brunswick, became the property of the Dominion. That act also provided that an intercolonial railway connecting the river Saint Lawrence with the city of Halifax should be immediately constructed by the government of Canada; and by another act of the same Parliament, in the same year, the British government was authorized to guarantee the interest on a loan, not exceeding £3,000,000 sterling, to be raised by Canada, for the purpose of constructing the railway between Rivière du Loup and

Truro. These arrangements were carried out, the work of construction of the Intercolonial was commenced without delay and prosecuted without intermission, and on 9 Nov. 1872 the division extending from Truro to Amherst, 76 miles, was opened. This division formed the connection between the Nova Scotia Railway and the European and North American Railway, and completed railway communication between Halifax and Saint John. The three railways, a total of 370 miles, were on the above date consolidated under the name of the Intercolonial Railway. These three railways forming the Intercolonial had been built with a gauge of 5 feet 6 inches, and they remained that gauge until 18 June 1875, when they were changed to 4 feet 8½ inches, the gauge in general use on this continent, and which had been adopted for the Intercolonial. Other extensions have been made from time to time, the following being the lines taken over within recent years: In 1911, the line from Ferrona Junction to Sunny Brae (Nova Scotia) was purchased (13 miles); in 1914, the New Brunswick and Prince Edward Island Railway (36 miles) began to be operated in connection with the Intercolonial; and in 1915, the Saint John and Quebec Railway, from Gagetown to Centerville, New Brunswick (105 miles). The Intercolonial Railway of New Brunswick, from Campbellton to Saint Leonards, New Brunswick, and the Maine border, has been operated since 1914 by the Intercolonial with the option of purchase within a five-year period. Receipts for year to 30 June 1915: Passengers, $3,947,-891; freight $7,187,449; gross receipts, $11,259,-710; operating expenses, $11,348,756. At 30 June 1915 the system had 411 locomotives, 500 passenger cars and 13,407 freight cars. The total cost of lines was $109,221,080.

The Intercolonial Railway was built, not as a commercial but as a political undertaking, and it has never paid, and was never expected to pay, interest on the capital investment. It has the disadvantage of having a circuitous route nearly 250 miles longer than that of the Canadian Pacific between Montreal and Saint John.

INTERCOLUMNIATION (from Lat. *inter*, between, *columna*, column), in classical architecture, refers to the clear space between two columns of a peristylos, or system of roof-supporting columns, though sometimes it means the distance measured at the lower parts of shafts, between their centres, and referred to in terms of diameter of a column at its base. A Roman architect and engineer, Vitruvius, a contemporary of Augustus, enumerates five varieties of intercolumniation, assigning by means of the foregoing scale of measurement, definite proportions to each. They are as follows:

1. Pycnostylos (Gr. *πυκνος*, "thick," and *στυλος*, column, implying thick arrangement), in which the spacing equals one diameter and a half. 2. Systylos (Gr. *συν*, with, and *στυλος*, column, that is, with columns harmoniously arranged), where columns are two diameters apart. 3. Eustylos (Gr. *ευ*, well, and *στυλος* column, as the derivation implies, a style preferred, and meaning with columns a due distance apart). Some authorities say the proportion was two diameters and a quarter; others, two diameters and a half. 4. Diastylos (Gr. *δια*, through, and *στυλος* column, implying columns wide apart), in which the space between the columns consisted of three, or even, according to some authorities, of four diameters. 5. Araeostylos (Gr. *αραιος*, wide, and *στυλος*, column, implying columns sparsely ranged), that style in which the distance between the columns used is four and sometimes five diameters,—the former distance being however that to which the name is in strict usage applied. It is suited only to the Tuscan order, and the span is possible only when the epistylium or architrave is of wood. A sixth arrangement is also known, the Araeosystylos (Gr. *αραιος*, wide, *συν*, with, *στυλος*, column), in which the intercolumniations are alternately systylos and araeostylos. This way of building places four columns in a space equal to eight diameters and a half. The central intercolumniation is equal to three diameters and a half, and the others on each side only half a diameter, so that coupled columns are introduced.

In the ruined remains of fine architecture which have survived down to the present time, ancient intercolumniation rarely if ever illustrates the Vitruvian dimensions, which therefore have, by some authorities, been regarded as arbitrary. He appears to have spoken only of Roman forms, or only of those of the Greek style, with which he became acquainted through such reports about Hellenic temples, as he had among his authorities. In the Doric examples, such as the Parthenon and the temple of Diana Propylæa at Eleusis, the proportion is said to be one and one-quarter (1¼) diameters. Temples of the Ionic and Corinthian order resemble each other. The proportions in these are, on the whole, greater; they average about two diameters. But it would be a mistake to overlook in this connection the relative proportion of height to diameter in a column, and to disregard the width of the peristyle. In one temple of the Ionic order, that of Apollo Smintheus, in Asia Minor, the peristyle is of double width, and the intercolumniation is just one and one-half diameters. To the ancients, the eustylos was the most correct as well as the most beautiful arrangement; and the author of 'De Architectura' preferred this proportion to that of any of the others, declaring it at one and the same time the strongest and the most convenient. Consult Vitruvius, 'De Architectura' (trans. by Morgan, Prof. Morris H., as 'Vitruvius: the Ten Books on Architecture' (Cambridge, Mass., 1915).

INTERDICT, an ecclesiastical decree which forbids the performance of certain acts of public worship. When an interdict was laid upon a town, district or country, all the churches were closed, the bells were silent, the sacraments, except infant baptism and extreme unction (and sometimes even these), were withheld, the rites of burial were not performed and all the public ceremonies of religion were suspended. Interdicts may be general, as applied to a country or city; particular, as applied to a parish or diocese; personal, as applied to a person, or some class of persons. The bishops seem to have anciently exercised the right of publishing interdicts; for in 870 Hincmar, bishop of Laon in France, issued one against a parish in his diocese. One of the earliest cen-

sures of this sort on record was imposed upon the city of Rouen in the 6th century on account of the murder of the Archbishop Pretextatus by order of Queen Fredegonda. In 997 Gregory V laid the kingdom of France under an interdict because King Robert had married his cousin, and the king was abandoned by most of his court. The same penalty was inflicted upon the kingdom of England under Stephen (1147) by Eugenius III, under John (1207) by Innocent III, under Henry VIII (1535) with little effect by Paul III and under Elizabeth (1587) by Sixtus V. Adrian IV laid Rome under an interdict for the purpose of compelling the Romans to drive out Arnold of Brescia. Gregory IX made use of the same instrument of compulsion in his quarrel with the Emperor Frederic II. During the Middle Ages the interdict was a powerful engine of attack for the popes in their contests with sovereigns, as the popular dread of its effects was so great that kings were often forced by rebellions to submit to almost any conditions in order that it might be taken off. From the time of the Reformation general and local interdicts have become rare. When Paul V laid Venice under an interdict in 1606, the churches were not closed, and only a minority of the bishops submitted to it.

INTERDICT, in Scottish law, an order issued by the Court of Session to stay or prohibit a person from an act presumed to be illegal or wrongful. It is similar to the injunction in English and American procedure. Consult Erskine, John, 'Institute of the Law of Scotland' (Edinburgh 1773; new ed., 1898).

INTERDICTION, in Scottish law, a process for protection from imposition of persons of imbecile minds. It is similar in process and effect to the American commission in lunacy. In Louisiana and Quebec the practice is similar to that of Scotland, these states having derived their legal system from the Roman law.

INTERESSE TERMINI, in law, the interest held by a lessee after the grant of the lease and before his actual entry. This interest has been held alienable at common law, and upon the death of the lessee it goes to his executors. Such an interest at common law, however, required an actual entry by the lessee to create an estate in him, but if the interest has been created by a conveyance under the Statute of Uses, the estate vests in the lessee at once without actual entry by him.

INTEREST. Interest is commonly defined as the return for the use of capital. It is made to include not only that which is paid by the borrower to the lender for the use of borrowed capital, but also that which the owner receives as a return for his own capital when he uses it in his own business. Even though the business man does not in his own thought divide his income up into parts, there seem to be excellent reasons for holding to this definition. That which he takes out of his business as income may all look alike to him, but if he is an economist he will pay some attention to the sources from which different parts are derived. If he puts in all or a part of his own time in his business, he will see that a part of his income is the earnings of his own labor. His income would certainly be less if he had to hire some one else to do this work which he himself does. If he owns a valuable building site, he will see that a part of his income is the rent of his land. His income would clearly be less if he had to rent the land from some one else. If he owns his own equipment free from debt he will see that a part of his income is interest on the capital invested. If he had borrowed the capital and paid interest to some one else, his income would obviously be less. Again, if he owns patents, possesses trade secrets or is in any way situated so as to benefit through special advantages, he will see that a part of his income is profits. Thus, his income would be divided into four parts, wages, rent, interest and profits.

The question of the source and cause of interest has been the subject of more controversy than any other single question in economics. The Socialists generally follow Karl Marx who contended that interest was the result of the cheating of the laborer, that if the laborers were paid the full value of their work there would be nothing left for the capitalist in the way of interest. Economists without exception reject this view, but they are divided among themselves as to the real explanation. Some are disposed to deny that capital is productive, but no one would deny that tools and equipment are useful. Since capital consists of nothing in the world except tools and equipment, capital is evidently useful. So far as any one has ever been able to explain, it is useful only in production. In short, the industrial community can produce somewhat more when it has an adequate supply of tools and equipment, that is, capital, than when it has not.

There is no industrial community to-day which could not advantageously use more capital than it has. So long as a community needs more of anything than it has, it will be willing to pay a price for it, or a reward to the person who supplies it. This applies to capital as well as to anything else of which a community had less than it needs.

Capital comes into existence, partly because some one spends money to buy tools and equipment. To be sure, the tools and equipment are made by labor and enterprise, but there would be no inducement to produce them unless some one were willing to buy them. When one buys tools rather than articles of consumption one may be said to postpone consumption, or to save. A farmer might, for example, buy a pleasure automobile or a farm tractor. If he decides to buy the farm tractor he postpones his enjoyment of an automobile which he may not be able to buy until the tractor has at least paid for itself. At the same time he has increased his power to produce food and that is a good thing for the rest of the community. It is better for the community that he should buy the tractor than a pleasure automobile, while, for a year or two, he will have less pleasure.

If the farm tractor merely paid for itself and nothing more, he will gain no advantage from its purchase. He will not be able to buy a better automobile later on than he might have bought at once. Meanwhile he will have lost a year or two of pleasure. If, however, the tractor will return him more than its cost, he will gain something by waiting to help compensate for the year or two of postponed enjoy-

ment. He may buy a better automobile, or buy something else in addition to an automobile.

Whatever the tractor returns him over and above its cost is interest. Nothing could be further from the truth than to say that interest in this is the result of cheating laborers. The farmer conferred a benefit on the community by buying the tractor rather than the pleasure automobile and at the same time he suffered a postponement of enjoyment. If he did not earn something as a result of this operation it would be difficult to find any member of the community who ever earned anything.

It is always advantageous to the community for any one to buy tools and equipment which are needed in production rather than articles of consumption which benefit him alone. It turns the productive energy of the community toward the making of tools and equipment rather than toward making articles of pleasure. The community's power of production is increased in the one case and not in the other.

But the purchase of productive instruments rather than of articles of pleasure does not, in every case, involve any genuine postponement of enjoyment. In the first place, the farmer may really derive as much joy from the running of a tractor as from the running of an automobile, though he would be a somewhat exceptional man if that were so. Nevertheless, the benefit to the community is as great as though running a tractor was irksome to him, and the community is willing to reward him as liberally. In the second place, a man may have such a large income as to be able to purchase practically everything in which he could possibly take any pleasure, and still have money enough left to invest in producers' goods, that is, in tools and equipment. In this case, his purchase of tools and equipment cannot be said to occasion any postponement of enjoyment. Nevertheless, so long as the community needs anything it is usually willing to pay for it whether it costs any sacrifice to the person who supplies it or not. This applies to capital as well as to anything else.

From the standpoint of the community, interest is paid because it is advantageous to have more capital than the community has got, in short, because capital is scarce relatively to the need for it. It is scarce primarily because men do not as a rule like to wait or to postpone enjoyment. They will postpone enjoyment if there is a prospect of more enjoyment in the future than in the present. They would rather have their articles of pleasure in the present than to have articles of production in the present unless, as a result of buying articles of production they will have larger means of enjoyment in the future. Though some waiting or buying of articles of production would doubtless be done for other reasons than the expectation of a surplus, not enough would be done to supply the community with all the capital it needs. In order to induce still further saving and purchasing of articles of production a surplus must be allowed as an inducement to those who would not save and invest for other reasons. This surplus is interest.

THOMAS N. CARVER.

INTEREST, as employed in psychology and pedagogy, is a term conveying at least two or three distinct ideas. The word also, in the vulgar sense, applies loosely to what is meant by personal advantage; as, for example, it is «to a man's interest» to obtain this or that. Etymologically, interest conveys the idea of a condition of being concerned about, or having a share in anything, in which sense also we find it used as a legal term. Perhaps its most definite meaning is that of the psychological law of interest, the law or principle that those elements of a past experience the most effective for recall are those which at the time of the experience received the greatest share of attention or aroused the highest degree of interest. Thus the great French psychologist, T. Ribot, uses the term. He remarks that «the influence of emotional states must be stated as a principle, but not as an exclusive cause. It is summed up in what Shadworth Hodgson has called the Law of Interest.» ('Psychology of the Emotions'). The word interest, derived from the Latin *interesse*, literally «to go between,» to make a difference, to concern, to be of importance, yielded in the course of a long evolution all the meanings of interest, both legal and psychological, as used in English.

Psychologically, interest may be broadly defined as the «consciousness which accompanies mental tendencies of any sort, so far as they terminate upon mental objects or stimulate to construction of them.» (Baldwin). It is also from another point of view a phase of feeling, an intellectual feeling. It is always manifested by voluntary attention. Its opposite is the feeling of alienation and repulsion that accompanies a presentation of matter that is foreign to the experience of a student, or other person. By attention one understands the «conscious activity of the mind.» Thus psychologically, interest and attention are closely allied *events*. Baldwin remarks that interest may be considered either as a stimulus or as a result of voluntary attention. Perhaps it is more precise to say that interest and attention are the subjective and objective aspects, respectively, of the same mental activity. This amounts to saying that the effective assimilation of new material into the course of experience is interest when viewed from the standpoint of the mental affections,— the emotion and personal attitude that accompany it. It is attention when viewed as the active outgoing of mental habits in grasping and in mastering the subject matter before one. All views of the relation subsisting between interest and attention acknowledge, at least, the intimate connection of the two; and it is precisely this connection which becomes significant in pedagogy. Like attention, interest as a state of the mind depends upon the proper balance of the old and new in experience. Neither interest nor mental activity appears to be the conditions of attention. Interest is either a general name for the subjective conditions of attention when ascribed to the object or it is used to designate a mood which accompanies all attention. Mental activity is really also bodily activity — a mass of sensations that comes from the contraction of muscles in different parts of the body. The contractions result from motor innervations which accompany attention. The interest of curiosity, the desire to know, may be defined as a primary form of interest, as distinguished from custom and habit and preference. Bald-

win regards the former as being more of the nature of a stimulation to the intellectual function; the latter he regards as the resultant of a frequent performance of the function. This latter aspect, he tells us, is that which also underlies the popular use of the term in the plural, "interests" meaning one's prevailing and permanent disposition.

Where the material is almost entirely novel, there is an excess of stimulation if there is interest at all. The responsive power of the mind under such conditions is not infrequently overwhelmed and confused, and as a result we have sometimes discouragement or aversion. These truths have their importance for pedagogy, as well as for the psychologist. As a feeling we may well remind ourselves that interest is the feeling that something, the object of the feeling, concerns one. As the word aversion implies, on the other hand, there is in it a strong tendency of the mind to turn away and devote itself to a more congenial and rewarding object than the one which should concern it. Even when this tendency is overcome in part, it means divided, and consequently wasted, energy, as compared with unified, whole-hearted activity, where interest is naturally and directly sustained. On the other hand, what is thoroughly familiar denotes the mastered, the habitual. This state of affairs awakens tendencies that work automatically and mechanically. If there is also a new factor about which habits may play, these habitual tendencies will furnish a foundation for intense and concentrated interest. But, it is a matter of common knowledge, if there is no stimulation beyond that evoking the established habits, the result will be ennui, monotony, routine; the effect is that of walking in a treadmill where nothing new is achieved. A certain degree of difficulty, a certain amount of obstacle to overcome, enough to set the problem of a readjustment of habit, is necessary for sustained interest. The self must be allowed to proceed with thoroughly awakened powers; and this is impossible without a challenging difficulty. The fact just stated throws light upon the relation between desire, or interest, and effort, and helps to place the relation of the doctrine of interest to that of discipline. The doctrine itself is in pedagogy a sort of expression for a number of different motives. As long as a child lives in the mere present he is absorbed in his immediate concerns only. All its powers are directed and discharged upon the immediately present stimulus. There are for the child few if any ends, or conceived results, to be reached after an intervening time, through the controlled adaptation of conditions as means. And whenever there is an end it usually lies in such a near future that but little thought has to be given to the management of the intermediate conditions. The state of immediate interest characterizes the play activities. In this sense only can one look upon interest as a form of amusement, a stimulus through the play-instinct to induce intellectual effort. When, however, more remote ends are to be reached by consistent and sustained maintenance of a series of acts that, of themselves lack immediate interest, but that are of interest because of their importance for the remoter end in view, we have mediate interest. Mediate interest being dependent on an idea, a purpose, a conscious aim, involves an intellectual interest in a way in which the emotional element accompanying direct absorption does not. The mediate interest is dependent upon the persistence of an idea, a conscious aim,—and this involves the thought of the bearing of the immediately present upon the attainment of this end. Control of the activity and the source of interest, reside in what is conceived—a thing always physically absent when it is a thing and not in perception when non-physical. The remoteness of the end in time means of course the increase in the number of difficulties to be dealt with, one after another. Therefore we may be certain that the seriousness, the depth of the interest of the self in its objective—its aim—is continually confronted with tests. Under these conditions, while physical effort will go to the means for reaching the end, the moral and the intellectual effort will be directed to sustaining the idea of a purpose in such force as to give it motive power. All the elements of apparent conflict of interest and effort, with immediate attractiveness, immediate agreeableness, immediate pleasurableness, on the side of interest, while serious and important values are all on the side of effort—is what disturbs some well-meaning educators. Hence the situation has been completely misinterpreted in theories of education, with respect to both its moral and other higher implications. In this way interest has been regarded by some as inherently unworthy, objectionable as a factor; some appear to assume that it operates only as a temptation away from the objectively important. Identified thus with the attractive and swerving power of the immediately pleasurable and placed over against what reason shows to be really worth while, it has been the source of much misery to both pupil and teacher. Its logic is bad; and its results are worse. Logically, it implies that the objectively valuable end is totally devoid of interest, so that sheer effort of the will has to be relied upon as the sole motive for keeping the self in its right course—for keeping it struggling against the seductions of interest. The previous analysis it is to be hoped will reveal the fault of this conception. For in truth what sustains effort is not sheer appeal to will power, but interest in an end, an interest, both indirect, intelligent, and at times, even moral, as distinguished from that which is immediate, purely personal, emotional, sensuous. We do not mean to imply that some ends should be immoral; it is intended above to take cognizance of the fact that there is a realm of the morally indifferent. The genuine educational need is therefore not to eliminate interest, but to foster indirect interest, the interest that is not immediate but mediate. Yet it would be well to remember that immediate interest also has its claims: it remains a fundamental trait of all æsthetic and artistic life. In either case whenever a pupil becomes intensely and sincerely interested in an end which reflection holds up, the sense of separation between means and end tends to disappear from consciousness.

Consult Arnold, F., 'Attention and Interest, a Study in Psychology and Education' (New York 1910); Boggs, S. P., 'Über John Dewey's Theorie des Interesses und seiner Anwendung in der Pädagogik' (Halle 1901); Dewey, J., 'Interest as related to the Will' (Bloomington, Ill., 1896); De Garmo, C., 'Interest and Educa-

tion' (New York 1902); Ostermann, W., 'Interest and its Relation to Pedagogy' (Trans. by E. R. Shaw, New York 1899).

INTEREST, Relation of Capital to. See CAPITAL.

INTERFERENCE, *in physics,* a name applied to the mutual action of "waves" of any kind upon one another, a phenomenon by which under certain condition the vibrations and their effects are increased, diminished or neutralized. A wave, obiter dicta, in the sense of the word as here employed, should convey the idea of a "forward-moving form of motion" (like waves in a wheat field), and should not convey — in a way productive of much error in the past — a notion of a "forward-moving mass of matter." (Consult Mach, 'Popular Science Lectures' 1910). Motion, finally is a change of place; a transformation, changing of forms involving displacements; a new arrangement of parts in space is the main result of motion.

As a word, interference was formed on the false analogy of such words as "difference"; it was derived from *interfere,* which in the Latin original *ferire* conveyed the idea of a horse striking one foot or ankle against an opposite foot or ankle, while moving along. Thomas Young in 'Philosophical Transactions' (1801) first introduced the term and the idea underlying it into optical studies, when he employed it in his Bakerian lecture on the 'Theory of Light and Colours.' Since Young's time, the idea of interference has been extended so as to describe any kind of coming together of "waves," whether those of snow, sand, water, light, sound, heat or electricity; in short, wherever the wave-motions exhibit a collision. Interference may be observed when two different trains of waves come together upon the surface of water or any other liquid. Where the crest of a wave belonging to one system coincides with the crest of a wave of the other system, the elevation of the water surface is sensibly equal to the sum of the heights that the separate waves would have if each existed in the same place alone. When a crest of one of the waves coincides with the trough of another, the disturbance of the water surface is reduced, and the elevation (or depression) which results is equal to the difference between the elevation of one of the component waves and the depression of the other one.

The kinds of interference that are of the greatest practical importance in physics are those which occur among sound waves or among waves of light. The phenomena in these cases are ultimately of the same general sort as those observed upon the surface of water. A familiar result of the interference of sound waves is the production of "beats" when two or more trains of waves, having but slightly different wave-length, come together while the two are moving in nearly the same direction. This phenomenon is exhaustively treated in Helmholtz's 'Sensations of Tone,' and it also receives a more or less adequate treatment in all of the better works on physics.

The more familiar of the interference phenomena that are afforded by light are those which are observed in connection with soap bubbles and with very thin plates of transparent solids. Light, upon striking the soap bubble or the thin plate, is reflected toward the eye from both surfaces, and the trains of light waves that reach the eye from these two sources, since they have a slight difference of phase (which varies, moreover, from point to point of the bubble or the plate), interfere with one another so as to produce effects that are often very beautiful and striking. A soap bubble, when viewed by monochromatic light, often appears to be covered with dark striæ; the dark lines being due to the fact that at the points that appear dark the two trains of light-waves, coming respectively from the inner and outer surfaces of the soap bubble, nearly or completely neutralize each other. When the bubble is viewed by white light, we do not commonly see the dark striæ, their places being taken by bands of color. This is because the different colors that compose white light have different wave-lengths, so that at any given point in the bubble only a portion of the colors are destroyed by interference, leaving the remaining constituents of the white light to produce their full chromatic effect upon the eye. For further information consult Cornish, V., 'Waves of the Sea and other Water Waves'; the same author's 'Waves of Sand and Snow' (both Chicago 1915); Michelson, 'Light Waves and their uses' (Chicago 1903); the book of Helmholtz, mentioned; Herz, H., 'Electrical Waves' (New York 1915), whose experiments laid the foundation of wireless telegraphy.

INTERIM, in the history of the Reformation, the name of several compromises forced on the German Protestants by edicts of Charles V, especially that of 1548, regulating religious and ecclesiastical matters "in the meantime," till they could be decided by a general council. The *Ratisbon Interim* was drawn up in 1541 by a commission which included Eck, Bucer, Pflug, Gropper, Pistorius and Melanchthon. Many doctrinal points were smoothed over, but the differences in regard to the ecclesiastical power and the sacraments were too great to be reconciled. By the Protestants in general, the whole movement was looked on as a scheme to entrap them into a formal return to the Roman Church. In 1548 at Augsburg the emperor appointed Agricola, Helding and Pflug to prepare a new interim. It conceded to the Reformers communion in both kinds, and the marriage of priests. Great opposition developed in North Germany and the pact was revoked in 1552. Elector Maurice of Saxony secured the adoption of the *Leipzig Interim* in 1548, according to which the Protestant creed remained intact, with an admixture of the old ceremonial; the papal and episcopal powers were also recognized to a limited extent. This compact failed to reconcile a great number of the Reformers, and it was the cause of division among them. Consult Lindsay, T. M., 'History of the Reformation' (Vol. I, New York 1906-07).

INTERIOR, Department of the, one of the executive departments of the United States government whose heads are cabinet secretaries. The "home department," long existent in all European governments, was constituted in the United States by act of 3 March 1849. Its functions had been exercised by bureaus or officials of nearly all the other departments: patents, copyrights, public documents and the census belonged to the State Department; public lands, mines and judicial accounts, to the

Treasury; Indian affairs, to the War Department; and pensions to the War and Navy, each for its own pensioners. By later laws the Interior was given charge of education, public surveys (including the Geological Survey; but the Coast and Geodetic Survey belongs to the Treasury), subsidized railroads, Territories, national parks and reservations, returns of public contracts made by several other departments, some charitable institutions in the District of Columbia, and a number of other matters. The Secretary makes an annual report of the number of public documents received and distributed. He has a salary of $10,000 and two assistant secretaries. All patents issued by the United States must be signed by him. The first Secretary was Thomas Ewing of Ohio. The list of secretaries since 1900 is Ethan A. Hitchcock of Missouri, James R. Garfield of Ohio, Richard A. Ballinger of Washington, Walter A. Fisher of Illinois and Franklin K. Lane of California. Besides the assistant secretaries and chief clerks, the Department of the Interior includes among its officials commissioners of Land Office, Pensions, Education, Indian Affairs, Patents, and directors of the Geological Survey, Reclamation Service and Bureau of Mines. In the annual report for 1915 the Secretary of the Interior calls attention to what he terms the "foundations of power" of the United States. The country possesses every mineral of importance needed in industry, and is the only country so fortunate. We produce 66 per cent of the world's petroleum, 60 of copper, 40 of coal and iron and 32 of lead and zinc. We can build a battleship or an automobile (excepting the rubber tires), a railroad, or a factory with the products of American mines and forests. To feed the soil we have plenty of phosphorus, some potash, and have learned to extract nitrogen from the air, having cheap hydro-electric power in abundance. We can produce all the grains, fruits, vegetables and fibres known to the temperate zone, and many tropical plants. And we have unlimited water power, besides two hundred and odd million acres of public lands; if we add Alaska, that is 400,000,000 more acres. We issue 200 patents a day to American inventors; of important patents granted by the United States since 1875, three-quarters are to American citizens. The great American desert, as we used to call it, is disappearing under the wise system that utilizes the money received from sale of public lands for irrigation works to reclaim the dry areas. The Secretary thinks the largest task awaiting our government is the proper dyking, damming and utilization of our rivers.

INTERIOR BALLISTICS. See GUNNERY.

INTERIOR BOUNDARIES. See BOUNDARIES OF THE UNITED STATES.

INTERIOR DECORATION. Under the general designation of interior decoration are included all the various applications of the DECORATIVE ART (q.v.) to the adornment of the interiors of buildings. The subject comprises *monumental* interior decoration, which is largely architectural and has to do with the decorative treatment of the floors, walls and ceilings of important buildings; and *domestic* interior decoration, which has to do with the furnishings as well as the architectural treatment of rooms and halls in private residences. The decoration of hotels and clubs occupies a position intermediate between the two divisions, partaking of one or the other character according to the architectural importance of the building. In the first division we are chiefly concerned with the architectural design of the interior, with columns, arches, pilasters, entablatures, moldings, niches, vaults, domes, ceilings, wainscoting, panelings and pavements; with the arts of mural painting, decorative sculpture and carving, mosaic and inlay, and stained glass. In the second division these architectural elements are less conspicuous and there enter considerations of furniture, carpets, rugs, tapestries, hangings and wall-papers, and of the comfort and manner of life of the dwellers in the house. The fundamental principles of art are the same in both divisions, but the applications are widely different.

Monumental Interior Decoration; Methods and Resources.— In order to make the interior of a great building — as a hall, church or theatre — decoratively pleasing, the artist may employ the resources of pure form or of color, or of both together, as is most often the case. Anyone who has seen the interior of Grant's tomb at New York realizes that its decoration is wholly one of form; of architectural features and paneling, executed for the most part in white plaster. At the other extreme is the Sistine Chapel of the Vatican at Rome; an interior almost absolutely devoid of architectural embellishment, made glorious by the decorative painting of its walls and ceilings by the greatest artists of the Renaissance. But in general, form and color are combined, as in the great basilica of Saint Peter, near by; in the superb Camera della Segnatura by Raphael in the Vatican; or, to take a modern instance, in the gorgeous staircase hall of the Opera in Paris. Fergusson in his 'History of Modern Architecture' (Introduction, p. 15) draws an interesting comparison between the interiors of the Sistine Chapel and of King's College Chapel at Cambridge. The last named depends chiefly for effect on the richness of its structural and architectural features, the former on its incomparable frescoes. Which is the higher and nobler sort of decoration? The answer will vary according to the taste and point of view of the answerer, and still more according to the quality and success of the artist's performance with one or the other method. Fergusson considers the Sistine Chapel as exemplifying the higher type of decoration, but objects to figure-painting on the horizontal parts of ceilings. The Arena Chapel at Padua, painted by Giotto (q.v.), he considers superior in method to the Sistine, however inferior in performance and technic of painting. One element in our judgment of the two systems must inevitably be that of the more sustained, varied and intellectual interest inspired by noble mural paintings as compared with richness of architectural detail. The content of mere architectural detail is soon apprehended, owing to its dependence on repetition of similar forms, and its novelty of interest is therefore soon exhausted. See MURAL PAINTING.

The resources of interior decoration of a monumental character are, then, first of all architectural forms or (collectively) *membering;* secondly, carving and sculpture; thirdly, the use of fine or semi-precious materials of

rich natural color, such as marble, porphyry, onyx, highly polished woods and the like; fourthly, the applied arts of inlay and mosaic and the kindred art of stained glass; and fifthly, mural painting, which includes the painting of ceilings and vaults and ranges from the simplest harmonies of flat coloring on the various surfaces, through all varieties of painted ornament to the highest forms of allegorical, symbolic and historic painting. To these resources should be added the decorative treatment of the accessories and fixed furniture of the building, such as grilles and gates and railings in metal, pulpits, choir-screens and sedilia in stone and marble and wood, and other like essential features of the interior equipment. All these resources may be called into service in a single interior to produce almost overwhelming effects of richness and splendor, as in the original state of the church of the Divine Wisdom (Hagia Sophia, now the mosque of Aya Sofia) at Constantinople, built in the 6th century; contemporary descriptions of this interior, in prose and in verse, exhaust the resources of language in the effort to portray the glories of that marvelous edifice. The interior of the Camera della Segnatura at Rome, mentioned above; of the cathedral of Sienna; of Saint Mark's at Venice; of the Taj Mahal (q.v.) at Agra (India) and of some of the Mogul palaces of that country; of certain halls in the Alhambra at Granada (Spain); of the staircase hall and *foyer* of the Opera at Paris; of the Panthéon and parts of the Hôtel de Ville of that city; of the Public Library at Boston, Mass., and of the Congressional Library at Washington, D. C., illustrate in varying ways and degrees such combinations of architecture and the applied arts respectively in mediæval, Reniassance and modern times.

Historical Survey; Pre-classic Decoration. — Certain caves in France and Spain have preserved to us the remarkable efforts of primitive man to adorn these interiors with paintings of animals. (See ABORIGINAL ART). These date back probably to an antiquity of at least 25,000 years. Then follows a hiatus of many millenniums preceding the earliest extant Egyptian interiors of tombs and temples, with which historic art in interior decoration may be said to begin. In the temples the solemnity of pillared hypostyle halls and of the sanctuaries was relieved and enriched by pictures and bands of hieroglyphics, cut into the stone in outline or carved in low relief, and painted in brilliant colors. The pictures represent gods and kings, sacrifices and sacred vultures, with conventional ornament executed in the same way. The walls of the tombs were adorned with scenes from real life, sometimes painted on plaster, sometimes cut in low relief on the stone (Tomb of Perneb in the Metropolitan Museum, New York). As ancient as some of these Egyptian works are the remarkable paintings of walls in Crete, especially at Knossos; while somewhat later in date (9th to 6th century B.C.) are the decorations in the palaces of the Assyrian kings. Low relief pictures on alabaster or limestone slabs formed a high wainscot in the halls of these palaces; above were probably borders in encaustic tile and tapestries or other hangings. In places even the pavements were of alabaster carved with ornaments in low relief.

The Classic Period.—Of the Greek interiors almost nothing has survived to our time; all the "restorations" shown in books and models are conjectural. We know from literary sources that mural painting was practised; the Stoa Poikile at Athens was a public colonnade whose wall behind the columns was covered with such paintings. At Olympia there was found a beautiful fragment of decorative pavement executed in hard stucco in black and white. Since color was freely used on the exteriors of temples it is probable that the interior columns and walls were painted and the wooden ceilings richly painted and gilded, perhaps paneled somewhat like the stone ceilings of the exterior colonnade or pteroma.

It was the Romans who, of all antique peoples, developed interior decoration to its greatest splendor by recourse to new methods and materials and processes. The Roman decorative system was that of a dress or sheathing or facing of fine material applied to a massive core-construction of coarser materials, such as rubble, concrete or brick. This was faced with stucco, or sheathed with marble and adorned with columns, niches, recessed arches, moldings, entablatures and panels, for which provision was made in the more massive primary construction. Columns were of polished granite, porphyry or marble; capitals and entablatures were richly carved; there was much ornament of stucco molded in relief and brilliantly painted, and ceilings and vaults were deeply paneled, with rich ornaments in relief painted and in parts gilded. The lower parts of the walls were wainscoted with precious marbles, and the floors were of marble in patterns of various colors or in mosaic of *opus Grecanicum*. (See MOSAIC). The vastness of the Roman interiors of temples, baths and basilicas unencumbered by columns, and the majesty of their lofty vaulted ceilings, produced effects of internal grandeur never before dreamed of, which were greatly enhanced by the splendor of the materials employed. The Pantheon remains to-day a marvelous example of this splendor, though deprived of the former enrichments of its majestic paneled dome. The brilliant wall paintings of Pompeii (q.v.), the Pompeiian and Roman painted reliefs in stucco, and many Roman mosaic floors, preserve for us examples of Roman interior decoration of a less monumental sort.

The Mediæval Styles.— With the fall of Rome, the leadership in the arts passed to Constantinople, where the Byzantine style rapidly developed in the 6th century to its culmination in Hagia Sophia, the church of the Divine Wisdom. It was pre-eminently a style of interior decoration, not of external splendor. Deriving from Roman precedents the system of massive vaulted construction with surface facing of marble sheathing and applied decoration, it introduced two new and transcendently important elements — the dome on pendentives and the use of pictorial and ornamental mosaic in brilliant colors on a gold ground, to cover all vaulted surfaces. Fine surface-incised carving was used sparingly and effectively, but the main effect was of rich and harmoniously-blended colors upon every visible surface. Fresco-painting (see FRESCO) was employed in some cases instead of mosaic on walls and vaults, at least in the later churches. The

Byzantine mosaic-workers and other artists found wide employment in Italy, and when in 1047 the Venetians set about the reconstruction of the church of Saint Mark, it was built upon the model of the church of the Apostles at Constantinople, largely by artificers from that city. Though much smaller than Hagia Sophia, and though some of its mosaics are of a much later age than the 11th century, it is to-day one of the richest and most splendid interiors in the world. Of much earlier date are the two basilicas of San Apollinare at Ravenna (6th century) with fine mosaics, those of San Apollinare Nuovo being particularly impressive. The baptistery of the Orthodox and the domical church of San Vitale at Ravenna also offer striking examples of Byzantine interior decoration in marble and mosaic.

The Romanesque period in western Europe, from the 8th to the mid-12th century, produced little of importance in interior decoration except in Venice as just noted, and in Sicily where a blending of Oriental and Byzantine influences has left to the world a number of remarkably beautiful and impressive interiors in churches and chapels at Palermo and in the neighboring cathedral of Monreale. The pavements of these are patterned in colored marble, the walls wainscoted with marble crested with Arabic patterns, the walls and domes and apses glow with impressive symbolic pictures in mosaic, and the timber ceilings were painted in brilliant colors The baptistery of Florence (10th century) and the neighboring church of San Miniato are exceptions to the general rule of severity of interior effect of the Romanesque architecture.

For the remarkable styles of interior decoration of the Arabs, Moors and other Mohammedan peoples — styles in which pictorial representation and sculpture were excluded by religious prejudice and geometric and conventional ornament in brilliant colors in plaster, tiles and inlay developed to their utmost splendor during the Middle Ages, see MOHAMMEDAN ART.

With the development of Gothic architecture, first in France, later in northern and central Europe, and finally in Italy, wholly new resources were brought to the service of interior decoration. Structural forms were multiplied and enriched, to enhance the decorative effect of the lofty vaulted naves and aisles. To the splendor of clustered shafts, grouped moldings, carved capitals, molded vaulting-ribs and intricate traceries were added symbolic sculptures and grotesques, and color was introduced in the blazing glory of the stained glass windows. To a limited extent also painting was resorted to in certain parts of the architecture and even of the sculpture, an decorative pavement-tiles in browns, blacks, dark reds and yellows were used with discretion on the floors of choirs and chapels; but the chief color effects were in the windows, whose brilliant hues tended to kill the soberer tones of painted walls and moldings. Mosaic and marble were not favored outside of Italy, and the vaults were seldom painted at all. The English interiors, less lofty and majestic than the French, were on the other hand far richer in decoration, with multiplied complexities of shafting in black Purbeck marble, finer and more numerous moldings, and, above all, magnificent vaults in complex patterns of vault-ribs. In Italy, in contrast with western and northern Europe, the mediæval builders of the Gothic period depended upon color rather than architectural membering for interior effect. They often painted both the walls and the vaults; splendid inlays of black, red and white marble adorned the floors; mosaic was frequently applied to restricted places or features, and the fixed furniture was of great decorative magnificence. Stained glass, however, was not much used; the Italian windows were small and far apart, and offered no such field for blazing transparent color as the clear stories and aisle windows of the North. The 14th century witnessed the culmination of this Italian mediæval art, above all in Florence, Assisi, Padua and Sienna. The mural paintings of the chapels and cloisters of Santa Croce and Santa Maria Novella at Florence, and the works of Giotto and his followers in Florence, Assisi and Padua are unsurpassed for pure decorative propriety and richness. (See GIOTTO; MURAL PAINTING). The «Upper» and «Lower» church of San Francesco at Assisi offers the most complete and perfect example of consummate interior decoration effected solely by the brush of the painter without any aid from architectural embellishments, to be found anywhere, with the sole exception of the Sistine Chapel of the Vatican at Rome.

Renaissance Decoration.— The Renaissance ushered in a new age and a new spirit in art. Not only were the fine arts thenceforward no longer confined almost exclusively to the service of the Church, but they were also transformed by two influences — a new and enthusiastic study of nature in all its aspects, leading to a new realism previously unsought; and a new inspiration from the arts and culture of antiquity. There was great increase of private luxury, and a marvelous broadening of the scope of painting and sculpture as well as architecture. Palaces were made as splendid as churches, and churches were adorned with new splendors in marble, stucco, painting and gilding. The dome became the dominant internal feature in church design, and often received a specially rich decoration of paneling and painting or mosaic. Delicate relief-ornamentation in stucco was combined with color, after ancient Roman models. Mural painting reached its highest development. Ceilings, whether vaulted or horizontal, were treated with especial magnificence, with rich paneling or painting or both combined. Rome especially abounds in splendid examples of this consummate art of the 16th century, as in the Loggie (arcades) of the Vatican, the Camere or Stanze (apartments) of that palace, the Villa Madama, and of course the incomparable Sistine Chapel. The vaults and dome of Saint Peter's and many other ceilings are noteworthy; while in Venice the walls and ceilings of the hall of the Great Council and of many other superb rooms display the master works of Titian, Tintoretto, Paul Veronese, Palma the Younger and others of the Venetian masters of oil painting. (See article PAINTING). With the close of the 16th century and throughout the 17th, decorative art declined — not in splendor but in taste. The love of display, the toleration of sham, the abuse of stucco, of gilding and of strong-colored marbles, and the introduction of theatrical and attitudi-

nizing sculpture, led to great extravagance and excesses of effect, destructive of real dignity and solemnity. Much of the interior decoration in Saint Peter's and nearly all that in the Jesuit churches of the 17th and 18th centuries, both in and out of Italy, is of this meretricious character. In Germany this "Baroque" style of interior decoration was especially riotous and uncontrolled by architectural propriety, though often amazingly clever and effective. In France the Renaissance style, introduced by Italian artists at first, ran a somewhat similar course, but never reached the extremes of artistic extravagance noted in Italy and Germany. Church interiors were much more severe, more sparing in applied decoration, and retained much more of structural expression and truthfulness. French palace decoration received under Louis XIV and XV a peculiar progressive development, making much use of white and gold, and of delicate though increasingly fantastic and capricious detail, as will be later noted. Under Louis XVI and under Napoleon ("First Empire") the tendency toward fantastic originality of detail was reversed, and interior decoration became more and more classic, restrained and finally severe.

The 19th century witnessed the almost total eclipse of true and sincere work in interior decoration, as in all the arts, for at least the first half of its course. Under Napoleon III ("Second Empire") there began in France a notable revival of all the arts, and, partly through French influence, this revival gradually made its appearance in other countries. The progress of archæology, the development of machine-manufacture, the immense expansion of commerce and industry, all tended, however, to lead artists astray and to hamper the development of original creation. On the other hand, the multiplication of schools of art and of museums and the growth of wealth and taste have given the arts a new stimulus and new opportunities. Among notable interiors of the last century in Europe may be mentioned in London the Houses of Parliament and the mosaics of Saint Paul's Cathedral, in Paris, the stair hall and foyer of the Opera, the stair hall and Salle des Fêtes of the Hôtel de Ville, and the mural paintings in the Panthéon. Examples in the United States will be noted later.

Present-Day Monumental Interior Decoration.— Outside of the United States, which form the subject of a separate section of this article, interior decoration has followed the general movement of modern art since 1900. As to style, two distinct currents are observable; one conservative and classic, tending to the revival or imitation and development of old-time traditions; the other, revolutionary and romantic, seeking new forms and methods of expression and striving to break away from tradition. These currents are equally discernible in architectural decoration and in decorative painting, and appear in the interior decoration of all the European countries in varying degrees. The decorators of the first group are subdivided broadly into the classicists and the mediævalists, according as they seek to reproduce the decorative effects of Greek or Roman types on the one hand or of Byzantine, Romanesque or Gothic art on the other. The multiplication of books, prints and photographs of historic art, the ease of modern travel and the greatly increased mechanical and material resources of our time have made such revival and imitation perfectly practicable and even rational. The practice in the best work is not to copy, but to design upon the basis of a thorough mastery of the principles and methods of the historic styles. The decorators of the second group, while they must of necessity start with something of the knowledge and experience accumulated by the centuries, consciously strive to avoid any suggestion of the forms, combinations and types of the past, and to devise in their place new and original media and forms of artistic expression. The movement of which their efforts are the result began in Paris near the end of the last century, and made a sensational appeal to the world-public in the great exhibition of 1900. It has been variously called "Art Nouveau" (New Art), "Moderne Kunst" (Modern Art) and "The Secession," and has been carried to the furthest extremes in Germany and Austria, especially in Bohemia. But its most notable productions have been rather in domestic interiors and the minor arts than in monumental interiors, and these for the most part in hotels, restaurants, theatres and other places of amusement rather than in churches and the more stately works of interior design.

Modern ecclesiastical interior decoration has generally followed, more or less closely, the traditional styles of the past; either the Gothic (or less frequently the Byzantine or the Romanesque), or the Italian Renaissance. Mural painting is less often depended upon than architectural enrichment and conventional ornament, the richest decoration being bestowed upon the chancel or choir or "Sanctuary" of the church.

Domestic Interior Decoration.— The purpose of the interior decoration of a dwelling is to effect a harmonious combination of form and color not only in the architecture of each room and hall, but also in its furnishings and accessories, with due reference to the size and scale of the house, and to the comfort, convenience and tastes of the occupants. The house as a whole must present a harmony of effect, and each room must present a pleasing harmony within itself. The house-interior differs from the interior of a great hall, church or theatre not only in its much smaller scale, which brings every feature of its decoration within a few feet of the spectator's eye, but also in its more intimate and personal character. The interior of a church or great public building, moreover, is designed to impress and please a miscellaneous public, no member of which occupies it for more than a few hours at a time; and it must be decorated in a manner looking to permanence, in a style which will not soon lose its public appeal. In the house, on the other hand, quite other conditions must be met. The house is to be lived in; its decoration must be the constant companion and environment of its occupants. These, moreover, are a family, for whose personal pleasure the decoration is designed, and their personal tastes must of necessity control the design. With a change of occupancy, all too frequent in our modern shifting society, it is likely that much or all of the decoration will be changed. Hence domestic

interior decoration is at once more personal and less permanent than the greater art of monumental decoration.

House decoration is in all countries subject to divers influences. There are in the first place the architects, who in designing the residence not only shape its plan, construction and exterior, but also give to certain parts of its interior a definite architectural character by the treatment of walls and ceilings, window-trim and door-trim, wainscots, chimney-pieces and cornices. Generally their work stops there, and the householder calls in a "decorator" to make the empty architectural shell more ornate and more habitable. The decorator directs the painting and gilding of certain parts, devises a color-scheme for each room and selects furniture and draperies, rugs and tapestries to complete the scheme. The owner may or may not have a voice in the production of the *ensemble*. He may be himself an art connoisseur, possessing fine furniture, rugs, hangings, bronzes and bric-a-brac which the decorator must work into his scheme. Or he may be a *nouveau-riche* with plenty of money and no artistic training, in which case he gives the decorator a free hand. It is largely to this latter sort of householders that we owe the rise of a large class of commercial decorating concerns, which take contracts for the entire decoration of a great house; and also of another large class of individual decorators who combine a keen sense of commercial advantage and acquaintance with market costs, with just enough artistic knowledge to impress their clients. It is rarely that a discriminating client, distrustful of his own taste and judgment, has the courage to call in a truly great artist to beautify his house. Such an artist may generally be trusted to seek his client's interest, to work in sympathy with his particular problem and to subordinate questions of mere personal gain to the higher artistic ends of his work. If the house be one of great architectural importance, he will work in conjunction with the architect. It is always desirable to establish some such collaboration at the very outset of any important architectural undertaking, whether public or private. The only hope of suppressing the charlatanism and the commercialism that infest the practice of house-decoration to-day lies in the gradual raising of the popular standards of taste. In this respect there has been undoubted progress in the last 20 years and further progress may be looked for in the future. The greatest enemy of good taste in the home is in all countries the love of luxury and display, and the constant desire to imitate the splendors of houses more costly than one's own. The passion for "period" rooms — that is, for rooms each decorated in the fashion and style of some bygone art-period — is evidence of a common misdirection of taste; it is an affectation which, it is true, may in competent hands produce highly artistic results; but it more often converts the home into a sort of museum of imitations. Simplicity and restraint are too often sacrificed to display; but there is observable in the best domestic interiors of our time, both in this country and abroad, an increasing recognition of the value of simplicity, of quiet dignity and of that harmony of form and color which gives the impression of restful domesticity.

The "periods" most frequently employed in elaborate house interiors are four from the French Renaissance and four from the English Renaissance. The *Louis Quatorze* style is that which was developed under Louis XIV (1643–1710) in the palaces of Fontainebleau and Versailles and in the many sumptuous residences of the nobility of France. White and gold predominate; the walls are paneled in gilt framing-moldings; a richly ornamented coving, with or without a bracket-cornice, frames the ceiling; the doors and wainscot in rectangular paneling are adorned with delicate painted ornaments. The marble fireplace supports a huge mirror in a sumptuous gilded frame. The seat-furniture of gilded wood is upholstered with specially woven tapestries, and the cabinets, tables, etc., are of mahogany or other dark wood inlaid with brass and tortoise-shell ornaments. The tapestries, curtains and hangings are of richly patterned materials of formal design. In the *Louis Quinze* style (under Louis XV, 1715–74) all rectangular and formal lines disappear; curves predominate in all panels, in the chimney-pieces and in all the lines of the furniture. Paintings of Cupids and of pastoral scenes occupy panels in covings and sometimes on walls, and the ornaments are of shells, scrolls and foliage of singularly ragged and contorted forms, yet (in the best examples) so delicate in execution and so playful in line as frequently to disarm criticism. The style wholly lacks structural expression and dignified restraint, but lends itself to the intimacy of a lady's boudoir or the abandon of a ballroom. The style of *Louis Seize* (Louis XVI, 1774–89) represents a reaction from these extravagances. The swaying curves disappear, structural propriety reasserts its claims; a delicately-refined severity of line is observed. Nearly all the furniture is of gilded wood with specially-woven upholstery, the gilded brasswork trim of the larger furniture is almost Greek in its purity of detail, and wreaths of flowers replace the restless foliage and scrolls of the preceding style. The *Empire* style followed, with dark, almost sombre draperies and massive furniture of dark wood, built on Roman lines.

The two earlier English periods — the *Elizabethan* and *Jacobean* are not always easy to distinguish. Both employ high wainscoting in wood, flat relief "strapwork," open work wooden balustrades, flat plaster ceilings with "all-over" paneling and ornaments in relief. But the Jacobean has none of the Gothic reminiscences that are met with in the Elizabethan; it employs pilasters and other classic details and especially the *gaine* or sheath-shaped pilaster, and the Jacobean chimney-pieces and furniture are more elaborate than the Elizabethan. The *Georgian* styles are those various phases of the English classic Renaissance which were outgrowths of the Italian Palladian influence of Inigo Jones, Wren and Gibbs; they are specially notable for a certain sober dignity and formality of detail, with richly carved woodwork, and constitute the parent style of our own Colonial. The *Adam* style, named from the Adam brothers, Robert and James, belonged to the closing period of the 18th century, and is the counterpart of the French *Louis Seize*; notable for delicate detail particularly in the plaster work and furniture.

Interior Decoration in the United States. — During the Colonial and early Republican periods the interior decoration of our few public buildings followed Georgian and Adam precedents, depending almost wholly on painted wood and white plaster. There was almost no color employed, and we possessed no mural artists capable of monumental decorative painting. There followed in the 30's and 40's a period of Greek revival, producing cold but dignified interior effects in some cases, but always without the aid of color. The earliest efforts at decorative color in public buildings seem to have been in New Orleans, where a nephew of Canova adorned the rotunda of the Hotel Saint Louis with colored panels and medallions in painted stucco-relief, and a French artist decorated the Opera House in rather staring colors which still remain. Shortly after this Brumidi, a second-rate Italian mural painter, with an assistant, Castigini, was employed in 1855 to decorate the drum and dome of the National Capitol with allegorical paintings, and continued to labor on this commission until his death in 1880. But the real beginnings of American decorative painting date from 1876, when the late John La Farge was entrusted with the interior decoration of Trinity Church in Boston, then approaching completion under the direction of its chief architect, Mr. H. H. Richardson. La Farge's work consisted in the designing of the entire color-scheme of the interior, including the flat coloring and the conventional ornament, as well as the mural paintings of religious subjects. Assembling a small corps of enthusiastic young artists — many of them since then famous — all inexperienced like himself in such work, and compelled to work in a hurry under every possible embarrassment, he achieved a triumphantly successful result, which profoundly influenced decorative art in America. His groups of 'Christ and the Woman of Samaria' and 'Christ and Nicodemus' are notable works, and launched him on a career that placed him at the head of American decorative painters. His "Ascension" in New York (church of the Ascension); his other religious paintings and some magnificent windows in various churches (among these windows being three in the Saint Paul's Chapel of Columbia University), and his allegorical paintings in the Capitol at Minneapolis and Court House at Baltimore, are all works of great artistic value in themselves, not merely as pictures, but as truly decorative elements in the interiors they adorn. Meanwhile (about 1874) the late William Morris Hunt had painted directly on the walls of the Assembly Chamber of the Capitol at Albany two vast and impressive allegories — 'The Discoverer' and 'The Flight of Night.' Unfortunately these have been sacrificed to structural alterations in the building.

During the period 1876 to 1886, the artistic awakening started by the influence of the Centennial Exhibition at Philadelphia had spread in a remarkable manner through the nation, and not only the architecture but all the decorative arts and industries had been transformed. Strong artistic personalities began to emerge; it became possible to produce in our own cities mosaics, carvings, metalwork and stained glass of the highest quality. Not only public bodies charged with the erection of State capitols, city halls, court houses and public libraries, but also private corporations building theatres and hotels began to realize the importance of entrusting the interior decoration of such buildings to great artists, and the wealthy builders of great houses followed their example. Very important was the influence of the Columbian Exhibition at Chicago (1893), in which many artists were employed to decorate parts of the buildings with paintings; but still more important was the work done about 1895 in two library buildings, the Public Library at Boston and the Congressional Library at Washington. In the first-named the great French mural painter, Puvis de Chavannes, adorned the staircase hall; the late Edwin A. Abbey, the loan-room, and John S. Sargent, the second floor corridor. The three works are in wholly different styles: the first, in light pale tones, is purely mural (see MURAL PAINTING); the second is almost purely pictorial in brilliant colors; the third is *sui generis*, the most original, mystically symbolic and magnificent decorative work in the country, representing by an extraordinary series of compositions the great religious conceptions that have come from the East and the development of Christianity. This work has been only recently completed. The Washington decorations — of stairhall, corridors and reading-room — are by a large group of painters — Blashfield, Vedder, Reid, Dodge, Walker, Pearce and others — very varied in treatment, partly historic, partly allegorical, producing on the whole a powerful impression of refined beauty, enhanced by the dignified decorative architecture of the interior, the work of E. P. Casey, and decorative statues by Adams, French, Bartlett and others. The Criminal Court building in New York, and later the Appellate Court in the same city, the Walker Art Gallery at Brunswick, Me. (Bowdoin College), the new State Capitol at Madison, Wis., and a long list of public buildings and churches throughout the country, the library of the University Club and several great hotels in New York, and the Great Hall of the New York City College, possess decorative paintings by E. H. Blashfield, Kenyon Cox, Edward Simmons, H. Siddons Mowbray and others of the artists named, and by others whom there is not space to enumerate.

The most notable example of American ecclesiastical decoration, with the exception of Trinity Church in Boston, is the church of the Paulist Fathers in New York, in which Mr. W. Laurel Harris, with the assistance of other artists, has for some years been engaged upon an elaborate and highly effective scheme in which mural painting, stained glass and mosaic are combined in a highly impressive manner.

As already observed, the architects and sculptors as well as the producers of mosaic carving, decorative stucco-work and metalwork, have all shared in the artistic revival and contributed to the success of the interior decoration of both public and private buildings. In the early 80's a group of men and women in New York calling themselves the "Associated Artists" collaborated in decorating the company rooms of the Seventh Regiment Armory and the charming little Madison Square Theatre, with draperies, embroideries, mosaic, metalwork and carved woodwork, upon quite original lines apart from classical traditions — a veritable

American *art nouveau*. For a number of years decoration of this sort, by color and ornament and effects produced by novel treatments of surfaces in wood, plaster, glass, stuffs, hangings, mosaic, marble and onyx, was the most characteristic form of decorative art in the United States. The greatest artist in this line was Mr. Louis C. Tiffany, who has developed entirely new products in glass, of great artistic splendor, both in decorative stained glass windows and in exquisite objects of small size, together with the arts of the mosaicist and inlayer. Mention should also be made of the decorative work, chiefly ecclesiastical, of the Lamb family in New York, in stained glass, mural painting, etc.; of Mr. Friederang's work in tempera and true fresco; of the beginnings made in tapestry-weaving, and of the great advances in recent years in decorative furniture, draperies and metalwork in the United States. And the great art of monumental interior decoration with the aid of mural painting, although for a long time the great success of the works in Trinity Church, Boston, and in the Albany Capitol, already alluded to, remained almost without fruit, has since made such rapid progress that in this field the United States has no longer any occasion as formerly for mortification at the scarcity of notable examples.

The lesser art of house decoration advanced at first more rapidly than the major art sketched above. The "Centennial" at Philadelphia opened the eyes of multitudes to the possibilities of beauty in the home through the harmonious combination of artistic draperies and furniture, and revealed especially the marvelous decorative fabrics and products of Japan. The first results were, no doubt, such as would arouse wonder and amusement to-day, but they were the sincere if blundering expression of a newly awakened artistic hunger. Under all the handicaps of commercial exploitation, inadequate training, and, above all, the absence of an artistic environment and inheritance such as Europeans enjoy, the arts of domestic interior decoration have made steady progress. Handwork and artisanship have been stimulated by guilds and exhibitions; artistic manufactures, such as the weaving of brocades, rugs and hangings of genuine artistic value, and the making of artistic furniture (see FURNITURE), have all been raised to a high plane of excellence. The architects of our houses are now in taste and competence the equals of their European confrères, and give to the interior design quite as much attention as to the exterior. Most important of all, the general level of taste of the public has been materially raised. Museums of fine and applied art, schools of decorative design, exhibitions, lectures and books on decorative art, have been greatly multiplied. The two great defects of the American taste in this field are, first, an often undiscriminating love of splendor; and secondly, a tendency to follow passing fashions and fads in decoration. Simplicity and repose are often sacrificed to richness and display. "Period" decoration and textual reproductions of historic styles, well enough in their way in certain cases and in moderation, militate against a more natural, personal and original expression of taste. But there is no denying that the artistic quality of even this sort of decoration has been steadily improving, and there is hope that with the maturing of our national character under the sobering effects of the World War, there will grow up in this field a national art having dignity, restraint, propriety and domestic expressiveness, appropriate to the American character and life.

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INTERJECTION, a word thrown in to express some sudden emotion or passion; an exclamation; e.g., ah! alas! ouch! d—n! They are hardly considered parts of speech, and never form grammatical parts of a sentence; and seem more akin to the sounds uttered by the lower animals than to articulate language. For attempts to read other meanings into them consult Delbrück, 'Grundfragen der Sprachforschung' (Strassburg 1901), and Paul, 'Prinzipien der Sprachgeschichte' (4th ed., Halle 1909).

INTERLAKEN, ĭn'tĕr'lăH-ĕn ("between the lakes"), Switzerland, village in the canton, and 26 miles southeast of the town of Berne, one mile southeast of Unterseen, beautifully

situated near the left bank of the Aar, in the valley of Boedeli, between the lakes of Thun and Brienz. It contains a beautiful old castle and numerous hotels. It is visited annually by 80,000 to 100,000 tourists. Pop. about 3,750.

INTERLOCKING DIRECTORATES. A term used to designate the method by which the interests of many companies normally in competition are controlled by the election into their directorates of a few men acting in the interest of the combination to which they belong. Obviously, the success of the interlocking directorate system is predicated upon a certain betrayal of trust toward the individual company which the director is expected to serve with singleness of purpose, for he is placed there by the combination to serve the latter's interests. In a recent official investigation it was shown that a large steel manufacturing concern was the owner outright of several railroads, and the directors of the steel company were also directors in 29 other railroads, operating in the aggregate more than half the railroad mileage in the United States and in 12 of the largest street-railway companies. Control was thus exerted over the purchasing departments of all this great body of steel users, and, of course, in the ultimate interest of the steel company, and not of the railroads which these directors were intended to serve. The control of this steel company was traced also in a number of gas, oil and water companies, and in telegraph and telephone companies, large users of iron and steel products, through the same system of interlocking directors, and it was shown that the assets of the companies thus controlled in the interest of the steel company totaled the prodigious sum of $16,000,000,000.

The reaction of public opinion to these disclosures was so prompt and vigorous that one of the largest banking houses in the country voluntarily withdrew its members, men of the highest financial standing, from upwards of 30 directorates of railway, industrial and banking concerns. The system is now thoroughly discredited, and the unadulterated responsibility of the director to his individual company has been emphasized both in legislation and by the courts.

INTERLOCKING SIGNALS. See BLOCK SIGNAL SYSTEM.

INTERLOCUTORY JUDGMENT. See JUDGMENT.

INTERLUDE, a light entertainment given between the parts of another, usually between the play and the after-piece. The term also designates a particular form of early English dramas occupying a place intermediate between the miracle plays and moral plays. In church music, the interlude designates a short melodious phrase played between stanzas. Consult Collier, 'History of English Dramatic Poetry' (Vol. II, London 1831), and Ward, 'English Dramatic Literature' (Vol. I, ib. 1875).

INTERMARRIAGE, marriage between persons of the same family or at least between persons closely related by blood. From a very early period we find traces of a general belief that such marriages were generally followed by degenerate children. Thus the deterioration of the American negro, of the Cretins, the Marrons and the Cagots of Europe is laid to this practice. Such an opinion, however, may be refuted by adducing the Jewish race in which intermarriage has not led to this result, the good physical condition of several Indian tribes despite their common practice of intermarriage and the flourishing condition of many native tribes of India. (See BREEDING; CONSANGUINITY; MENDEL'S LAW). Consult 'New Encyclopedia of Social Reform' (New York 1910).

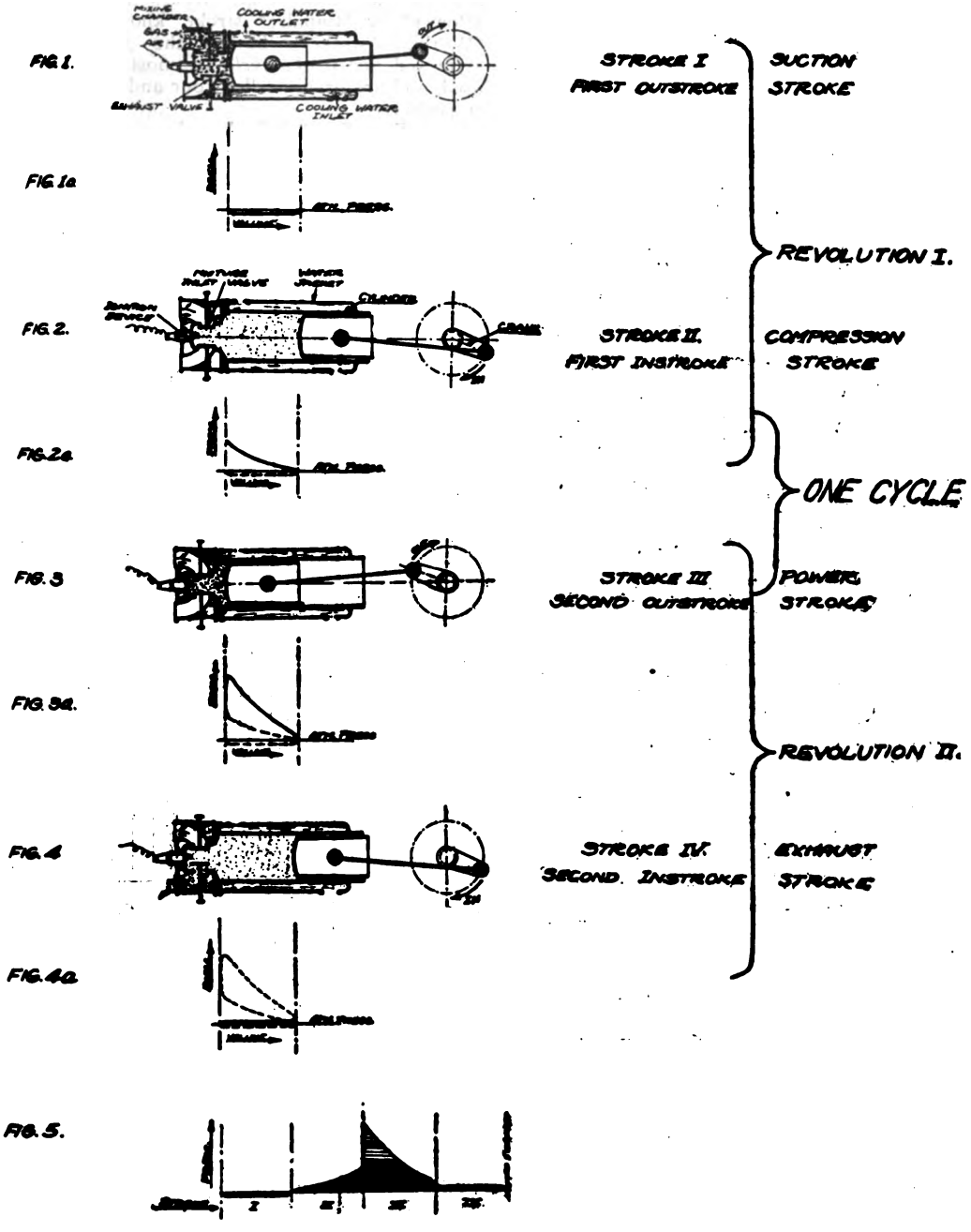
INTERMEDIATE STATE, *in theology,* is the presumed condition of the soul between death and resurrection. As nothing definite is known — or can be known — with regard to the progress of the human soul after death, practically all systems of religion have developed more or less elaborate theories on the subject. In Christianity there are two broad lines of cleavage — that of the Protestant side which believes that "The souls of believers are at their death made perfect in holiness, and do immediately pass into glory" (answer to Question 37 in the Shorter Catechism); and that of the Roman Catholic faith, wherein the view is held that there is an intermediate state (Purgatory) between or antecedent to heaven and hell. In this state, it is believed, the soul awaits and is gradually prepared for its final destiny. This belief is also held in the Greek Catholic or Orthodox Church, while it is not admitted by Protestants. Indications can be drawn from Scripture that at death the soul passes into some state of weal or woe, and that this state is not final.

INTERMEZZO, a dramatic interlude, consisting either of an instrumental or vocal piece performed between the acts. Intermezzi were features of early Italian drama and opera, and gradually developed their own independent form as Opera Buffa, which were later given separate performance, the ballet divertissement thereafter serving as intermezzi for grand opera. Consult Grove, 'Dictionary of Music' (Vol. II, London 1910).

INTERNAL COMBUSTION ENGINE. **I. Definitions.**—An energy transformer, which converts chemical energy stored up in solid, liquid or gaseous combustible matter into heat and then into mechanical work, is called a *Heat Engine.* The heat is produced by the combustion of the fuel in air, and if this combustion takes place within the cylinder of the engine itself, the latter is generally termed *Internal Combustion Engine,* working on the principle of either the reciprocating engine or the turbine. While the external combustion engine, i.e., the steam engine, receives its working medium, the steam, ready made, and depends therefore on such auxiliaries as the boiler and furnace, the internal combustion engine has to produce its own working medium — hot high-tension gases, and moreover must do this in a fraction of a second. Hence the internal combustion engine fulfils the functions of the steam engine and the steam boiler with furnace combined, and is simpler than the latter; but it is just this simplicity which presents much more difficult and diverse problems in the design and construction of the internal combustion engine than in the steam engine. The ability of the internal combustion engine to utilize almost any kind of fuel and its broad field of application to stationary and automotive power generation have brought into use such easily

definable and special names as Illuminating Gas Engine, Producer Gas Engine, Blast Furnace Gas Engine, Coke Oven Gas Engine, Natural Gas Engine, Alcohol Engine, Gasoline Engine,

1. THE CYCLIC FUNCTIONS, i.e., the *Admission, Compression, Ignition* and *Combustion* of the *Charge* within a fixed space, called *Combustion Chamber,* thus producing *Expansive*



Heavy Oil Engine, Automobile Engine, Truck Engine, Tractor Engine, Marine Engine, Aircraft Engine.

II. Fundamental Principles.— Whatever the fuel or the field of application may be, every internal combustion engine has to satisfy the following main requirements:

Power, and finally the *Exhaust* of the *Burned Gases.*

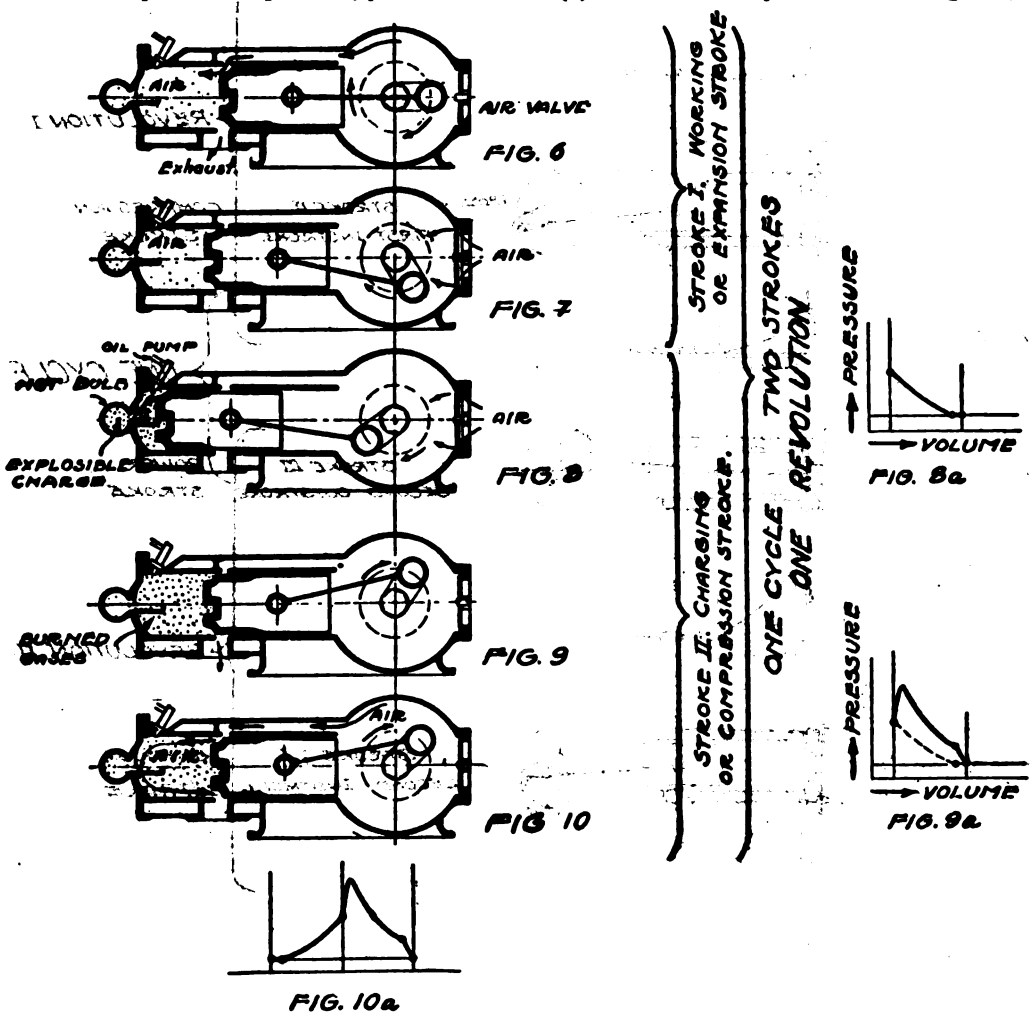
2. THE TRANSMISSION OF THE POWER from the *Combustion Cylinder* to the *Shaft.*

3. THE CONTROL OF THE TEMPERATURE OF THE MECHANICAL ELEMENTS by means of *Cooling Devices.*

4. The Adaptation of the Power Supply of the Engine to the Load Demand upon the Engine by means of *Governing Methods.*

5. The Mixing of Fuel and Air by means of *Carburetors* and *Atomisers.*

These problems are of a chemico-physico-mechanical nature, and are intimately interwoven. Each of the requirements cannot, however, be realized to its highest degree. For instance, with regard to stress conditions, it is very desirable to keep the cooling medium at the lowest possible temperature; yet the lowest fuel consumption is attained only at a fairly high temperature of the cooling water. Thus in all practical cases there can be only an approximate solution, which must necessarily be a happy balance between contradicting conditions. Furthermore, the location of the engine as well as the kind of service causes still more difficulties, and indeed difficulties of a special nature. The problems of the air-craft engine, for instance, are decidedly different from those of the automobile engine, while the latter requires features of design which are seldom embodied in the stationary type of engine.



1. **Cyclic Functions.**—In order to satisfy the above five basic requirements, the internal combustion engine has to pass through a definite "Cycle of Operation"; that is, its piston has to make a number of single strokes to gain one "Power" or "Impulse" stroke, known as the "Working stroke." To-day the *four-stroke cycle* and *two-stroke cycle* are most commonly used, and are briefly called four and two cycle, respectively.

(a) Four-Stroke Cycle.— In the diagrams, Figs. 1 to 4, a four-stroke cycle single acting gas engine is briefly illustrated.

Fig. 1 represents the engine with the piston on the suction stroke, or its first out-stroke. During this stroke a charge of gas and air, previously mixed in the mixing chamber, is taken in through the inlet valve. In Fig. 2 the piston is starting on its first in-stroke or compression stroke. The inlet valve is closed and the charge compressed. At or near the end of the stroke, ignition occurs. Fig. 3 shows the piston, just after the ignition of the gases, at the beginning of the working stroke, which is

now the second out-stroke. Due to the combustion of the mixture within the cylinder, both the temperature and the pressure of the gases increase suddenly. The high-tension gases thus produced drive the piston out, and while doing this useful work gradually expand to nearly atmospheric pressure. At the end of this stroke the exhaust valve is opened and the inert gases are forced out of the cylinder during the fourth stroke, Fig. 4, known as the exhaust stroke, at or near the end of which the mixture inlet valve is opened, starting the cycle over again. The changes of pressure within the cylinder during the different strokes are represented in the pressure-stroke or pressure-volume diagrams, Figs. 1a, 2a, 3a, 4a; in Fig. 5 these pressure-volume diagrams are developed. During the first, second and fourth strokes the engine performs the functions of a pump, deriving its power from the excess energy stored up in the flywheel during the power stroke. The power is automatically adapted to the load demand by a governor acting on the gas inlet throttle value. During the cycle, a cooling medium, usually water, flows through the jacket surrounding the cylinder to carry away the heat transmitted through the cylinder walls, thus preventing overheating of the latter.

(b) Two-stroke Cycle.— To illustrate the two-stroke cycle principle, a two-stroke cycle single acting oil engine has been selected. See Figs. 6 to 10.

In Fig. 6 the piston is in its outer dead centre position. The ports for both the scavenging air and the exhaust are uncovered by the piston, while the air inlet valve in the crankcase is closed. The cylinder as well as the crankcase is filled with air at atmospheric pressure. The piston on its in-stroke (Fig. 7) slides over the air inlet port, cutting off the cylinder from the crankcase. This causes the pressure in the latter to fall below that of the atmosphere, thereby opening the automatic air inlet valve and admitting fresh air to the crankcase. Further sliding of the piston then cuts off the exhaust port from the cylinder and compression starts. Before the piston reaches the inner dead centre (Fig. 8) the fuel is sprayed into the combustion space, which in this case is the hot bulb, where it is vaporized, mixed with air and ignited near dead centre; the first operation in the two-stroke cycle — the compression stroke — is now completed. The temperature and the pressure of the gases within the cylinder increase quickly, and the high-tension gases, expanding gradually, force the piston out (Fig. 9), thus doing useful work. At a point where the piston has yet to travel about 15 per cent of its stroke, the exhaust port is uncovered by it and the exhaust gases are discharged. Further sliding uncovers the inlet port (Fig. 10), and the air in the crankcase, being compressed slightly above atmospheric pressure, rushes into the cylinder and sweeps out or scavenges the inert gases. This completes the cycle. Figs. 8a, 9a and 10a illustrate again the changes of pressure within the cylinder during the cyclic events. One further feature to be noted is the necessity of a fuel pump for the two-stroke cycle engine. During the compression stroke, the excess of energy which was stored up in the flywheel during the power stroke, is consumed. The power is adapted to the load by the action of the governor on the fuel pump. To assure continuous operation some heat is transmitted through the walls and carried away by the cooling medium passing through the water jacket.

(c) Four-Stroke versus Two-Stroke Cycle. — Even though the two-stroke cycle is theoretically superior to the four-stroke cycle, yet the latter predominates. We can very readily see by comparison why this is true. The main advantages of the four-stroke cycle are its simple construction, high speed and low cost for small engines; its disadvantages being the varying torsional moment, heavy flywheel, small specific output, large dimensions and contamination of the new charge by the burned gases. As to the main advantages of the two-stroke cycle, they are a specific output which is about 75 per cent to 90 per cent larger than in the four-stroke cycle; the size of the engine is about half of that of a four-stroke cycle engine for the same power output, hence it has lower weight; good scavenging with a correspondingly purer mixture and larger unit charge; elimination of valves by using slots or ports in cylinder walls, thus assuring a more reliable construction; more uniform torque; ease of reversibility; large overload capacity; ratio of cooling surface to displacement volume larger, hence better cooling effect and higher compression than in the four-stroke cycle. On the other hand, we have disadvantages which may be stated as follows: the charge must be moved through two cylinders, hence greater frictional resistance and lower mechanical efficiency; low speed; heat losses during the power stroke larger than in the four-stroke cycle. Quite recently, however, the two-stroke cycle has come into wider use, especially for high power units operating on crude oil as fuel. Among experts it is a doubtful question as to the superiority of the one over the other, the more so as the two-stroke cycle engine is not yet fully developed. Only the future can tell which of the two will be the final victor in the race for supremacy in design, construction, operation and economy.

(d) Constant Volume and Constant Pressure Cycle.— In both the four-stroke and two-stroke cycle engines, ignition with consequent combustion of the charge, or the introduction of heat into the cycle, may take place either at approximately constant volume with pressure increasing rapidly (Fig. 11), or at approximately

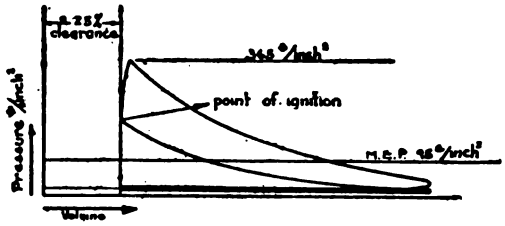


FIG. 11.— Average Pressure-volume diagram of Otto Engine at Full Load.

constant pressure with volume increasing gradually (Fig. 12). In the first case the engine is usually spoken of as an "Explosion" or "Otto" engine, while the constant pressure engine is usually called a "Combustion" or "Diesel" engine. The late August N. Otto of

Cologne, and the late Rudolph Diesel of Munich were the first successful builders of the constant volume and constant pressure engines, respectively.

There have been many other cycles invented and more or less successfully applied (see *Historical Development*), yet the fact remains that almost all internal combustion engines in practical operation to-day are running either on the Otto cycle or on the Diesel cycle, the former being the older and considerably in the lead.

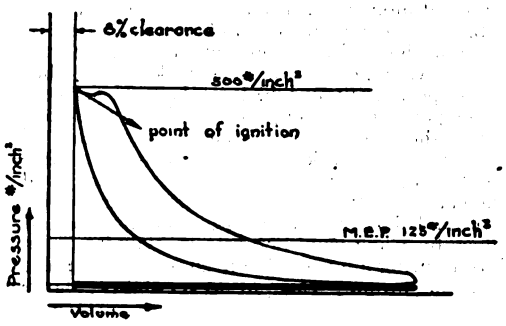


FIG. 12.—Average Pressure-Volume Diagram of Four-stroke Cycle Diesel Engine at Full Load.

In comparing these two cycles as to theoretical thermal efficiency, it is assumed that: (1) the gas used follows the law of a perfect gas; (2) the ratio of the specific heats "κ" is constant; (3) the cylinder in which the cycle takes place is absolutely heat tight, i.e., adiabatic heat conditions exist; (4) the inlet and outlet valves open and close exactly at dead centre; (5) the work consumed during the suction and the exhaust strokes is neglected.

Otto Cycle.—Referring to Fig. 13, we can follow through the different operations of the

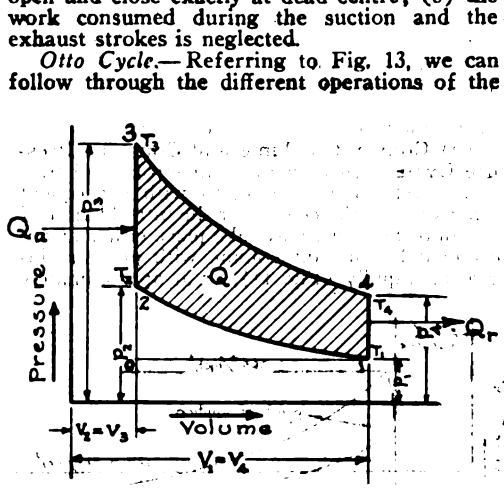


FIG. 13.

cycle. Suction occurs along the line 0–1; adiabatic compression along 1–2; ignition and combustion at constant volume and addition of heat, Q_a, along the line 2–3, with a resulting increase of the absolute temperature T_2 to T_3 and pressure p_2 to p_3; adiabatic expansion along 3–4; and exhaust along 4–1–0, whereby heat, Q_r, is rejected along 4–1. This completes the cycle and the heat $Q = Q_a - Q_r$ has been transformed into work represented by the area 1–2–3–4–1. As the efficiency is the ratio of the output over the input we can write the expression:

$$1)\quad \eta_t = \frac{Q}{Q_a} = \frac{Q_a - Q_r}{Q_a}$$

$$\eta_t = 1 - \frac{Q_r}{Q_a}$$

According to the laws of thermodynamics,

$$2)\quad Q_a = Wc_v(T_3 - T_2) = \text{heat added};$$

$$3)\quad Q_r = Wc_v(T_4 - T_1) = \text{heat rejected};$$

where W is the weight of the charge and c_v the specific heat at constant volume. Then, since

$$4)\quad \frac{T_2}{T_1} = \frac{T_3}{T_4}, \text{ and for adiabatic curves}$$

$$5)\quad \frac{T_1}{T_2} = \left(\frac{V_2}{V_1}\right)^{k-1} = \frac{P_1}{P_2} \text{ equation 1 assumes the}$$

form

$$1a)\quad \eta_t = 1 - \frac{1}{r^{\kappa-1}} = \text{theoretical thermal efficiency}$$

of the Otto cycle, "r" being the ratio of compression, $\frac{V_1}{V_2}$. Thus the thermal efficiency of the Otto cycle increases with the compression ratio "r", as well as with the ratio of specific heats "κ". Since the latter is a function of the mixture ratio of gas to air, the efficiency depends also on the mixture ratio. Lean mixtures give higher values of κ and better efficiencies than rich ones. For instance, for $\frac{V_1}{V_2} = r = 2$ and $\kappa = 1.2$, $\eta_t \cong 13$ per cent while for $\frac{V_1}{V_2} = r = 10$, $\eta_t \cong 60$ per cent.

Diesel Cycle.—As in the Otto cycle, we can determine the thermal efficiency from the theoretical card. Referring to Fig. 14, suction takes place along 0—1; adiabatic high compression of the air along 1–2; spraying of fuel into the cylinder by means of highly compressed air, self-ignition and combustion along 2–3, thus adding the heat, Q_a, to the cycle; adiabatic expansion along 3–4; exhaust along 4–1–0 whereby heat Q_r is rejected. The cycle is thus completed, the heat $Q = Q_a - Q_r$, being transformed into work represented by the area 1–2–3–4–1. Using the same notation as above, we have,

$$6)\quad \eta_t = \frac{Q}{Q_a} = \frac{Q_a - Q_r}{Q_a} = 1 - \frac{Q_r}{Q_a}$$

$$7)\quad Q_a = Wc_p(T_3 - T_2) = \text{heat added};$$

$$8)\quad Q_r = Wc_v(T_4 - T_1) = \text{heat rejected:}$$

$$9)\quad \frac{T_3}{T_2} = \frac{V_3}{V_2} = L$$

"L" being the ratio of the loads or ratio of cut-off volume to compression volume.

$$10)\quad \frac{T_4}{T_1} = \left(\frac{V_3}{V_2}\right)^{\kappa} = L^{\kappa}$$

Equation 6 takes the form

$$6a)\quad \eta_t = 1 - \frac{1}{r^{\kappa-1}} \times \frac{1}{\kappa} \times \frac{L^{\kappa} - 1}{L - 1},$$

giving the theoretical thermal efficiency of the Diesel cycle. The thermal efficiency of the Diesel cycle thus depends not only on the ratio of compression r, and the ratio of specific heats κ, but also on the ratio of the loads L.

For instance,

for $r = 13$, $\kappa = 1.41$, $L = 1.5$, we get $\eta_t =$ 61.5 per cent

and for $r = 13$, $\kappa = 1.41$, $L = 3$; $\eta_t = 54$ per cent.

This shows that the thermal efficiency of the Diesel cycle decreases with the increase of the ratio of loads.

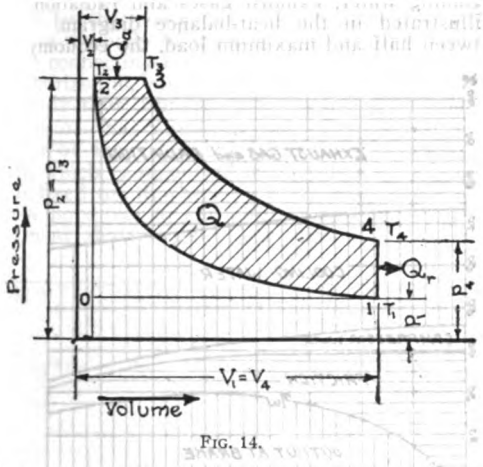


FIG. 14.

In Fig. 15, the efficiencies of the Otto as well as of the Diesel cycle are graphically represented for equal ratios of compression, r, heats, κ, and loads, L. From these diagrams it is evident that at equal compression ratios, the Otto cycle is superior to the Diesel. In practice, however, the Otto cycle is limited in regard to the compression ratio ($r = 8$), in order to prevent pre-ignition, while the Diesel engine must essentially use a high compression, r being in this case approximately 16. At a low ratio of load, $L = 1.5$, the Diesel engine has the higher efficiency. At full load however, L being approximately 3, the thermal efficiency of both cycles is about the same, in which case their maximum combustion pressures, p_2, are about the same.

2. Transmission of Power from Cylinder to Shaft. (A) *Indicated Efficiency. Indicated Horse Power.*— The thermal efficiency as computed above can never be realized in practice since many factors upon which it depends cannot be mathematically considered. Thus the assumption that compression and expansion curves are adiabatic in character is not true. There must be heat losses due to cooling, radiation, incomplete combustion and several other reasons. The degree of variation of the specific heats with a change in temperature or pressure or both is still an open question. The combustion lines are never true constant-volume or constant-pressure lines. Fig. 16 shows

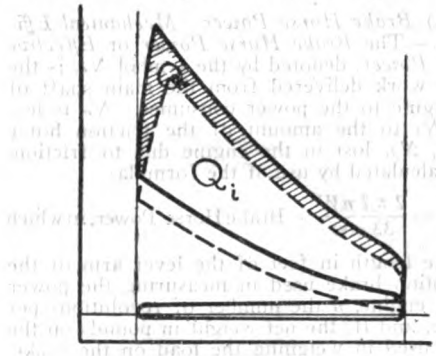


FIG. 16.

the theoretical diagram representing the heat Q, and the actual diagram representing the indicated heat, Q_i, actually converted into work. The difference of the two areas gives the actual loss due to the factors cited above. The ratio $\frac{Q_i}{Q}$ has a value from .5 to .8 and is sometimes called the card factor.

The theoretical efficiency, η_t, is thus reduced to: $(\eta_t \frac{Q_i}{Q}) = \eta_i$ the Indicated Efficiency.

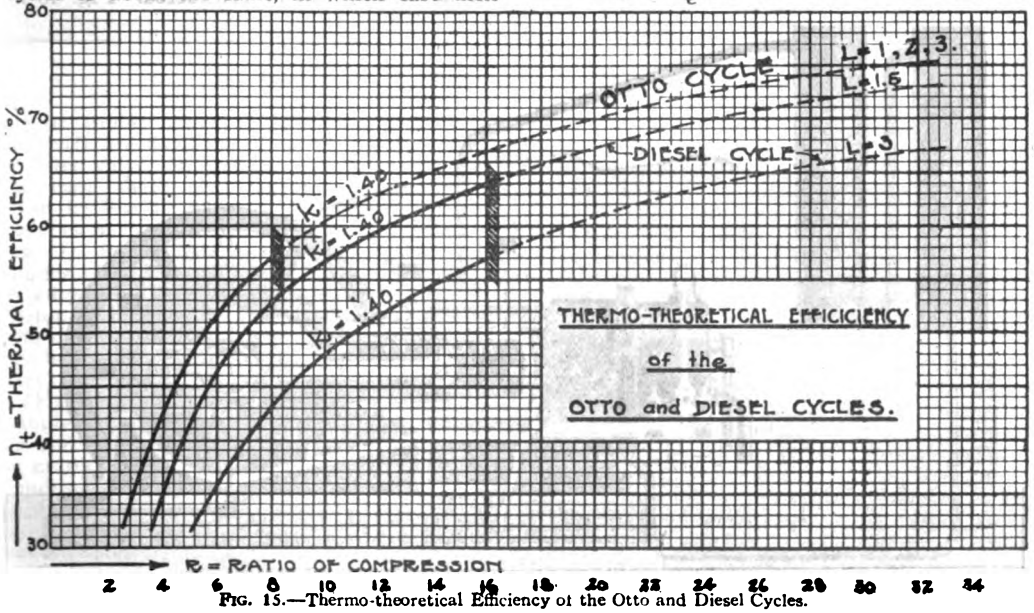


FIG. 15.—Thermo-theoretical Efficiency of the Otto and Diesel Cycles.

The *Indicated Horse Power*, denoted by the symbol N_i, is the work actually developed within the cylinder.

It is in direct proportion to the area of the pressure-volume or indicator diagram as actually obtained by means of an indicator, and can be computed by means of the formula

$$N_i = \frac{p_i\ S\ A\ X}{33{,}000} = \text{indicated horse power,}$$

in which p_i is the mean indicated pressure from the indicator diagram in pounds per square inch, S the length of the engine stroke in feet, A the net area of the piston in square inches, X = the number of power strokes per minute, and 33,000 the number of foot-pounds per minute in one horse power.

(B) *Brake Horse Power. Mechanical Efficiency.*— The *Brake Horse Power* or *Effective Horse Power*, denoted by the symbol N_e, is the actual work delivered from the main shaft of the engine to the power consumer. N_e is less than N_i to the amount of the friction horse power, N_j, lost in the engine due to friction. It is calculated by use of the formula

$$N_e = \frac{2\,\pi\,l\,n W}{33{,}000} = \text{Brake Horse Power, in which}$$

l is the length in feet of the lever arm of the absorption brake used in measuring the power of the engine, n the number of revolutions per minute, and W the net weight in pounds on the scales used in weighing the load on the brake.

The *Mechanical Efficiency*, η_m, is the ratio of the brake horse-power, and is expressed as $\eta_m = \frac{N_e}{N_i}$. Test results show an increase in η_m with an increase of the ratio of loads, but a decrease of η_m with an increase of the ratio of compression if p_i does not change materially.

(C) *Over-all Efficiency.*— The product of $\eta_i \times \eta_m \times \eta_w$ = *Over-all Efficiency*, commonly called "Brake Efficiency" or "Economical Efficiency." It furnishes the means by which the value of any internal combustion engine with regard to fuel economy may be measured.

This economical efficiency, η_w, varies with the load of the engine, as shown in Fig. 17, which is the *heat-balance diagram* of a 15 HPe (effective) Diesel Oil Engine. At normal output, 15 H.P. of the engine, 30 per cent of the available heat is converted into useful work, while the remainder is lost in friction, cooling water, exhaust gases and radiation, as illustrated in the heat-balance diagram. Between half and maximum load, the economy of the Diesel Oil Engine varies only slightly, in which respect it is superior to the Otto engine which shows a more rapid decrease in economy.

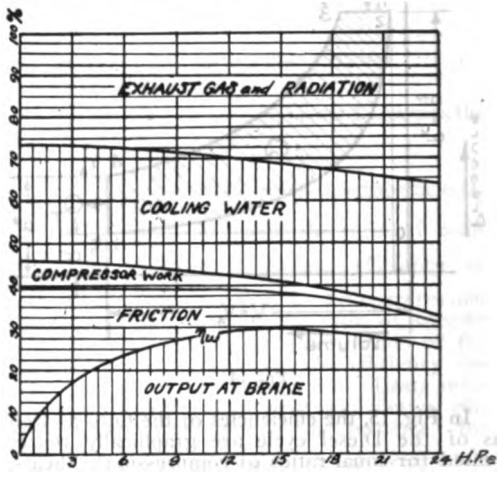


FIG. 17.—Heat Balance Diagram of 15 H.P. Diesel Motor.

(D) *Essential Mechanical Elements.*— The power developed within the cylinder may be transmitted to the rotating shaft either according to the turbine or the reciprocating engine principle. As, to-day, gas turbine power is not in practical use for internal combustion engines, the latter only will be considered. Fig. 18 il-

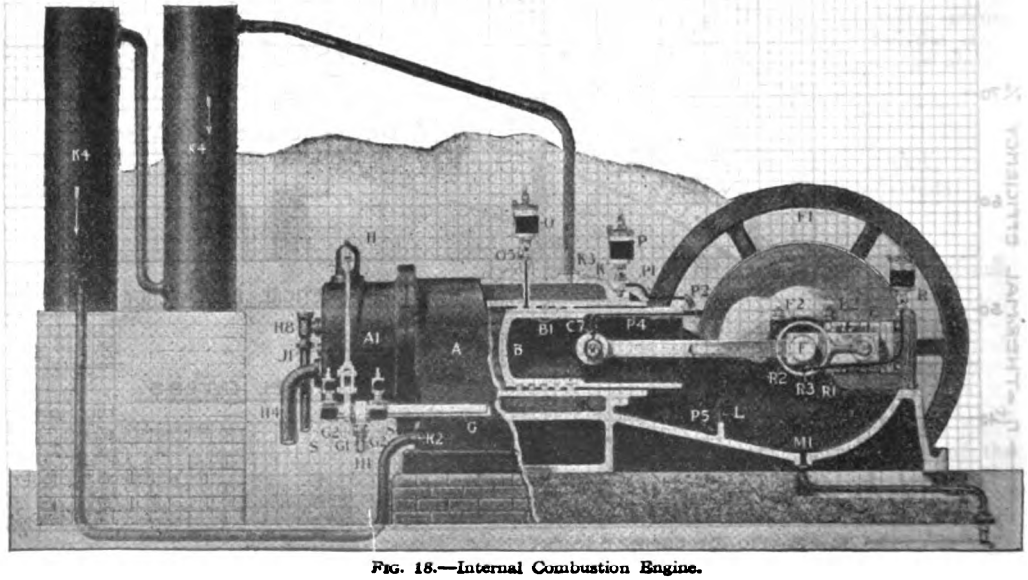
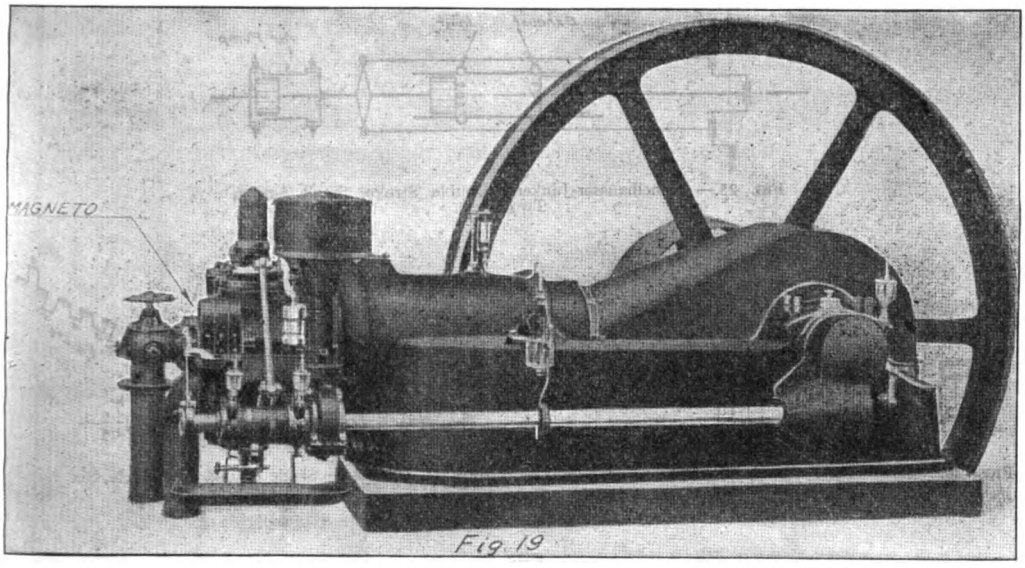


FIG. 18.—Internal Combustion Engine.

lustrates the mechanical elements of a single-acting, horizontal gas engine.

In the cylinder, A, is a close-fitting trunk piston, B, a long open-ended piston, fitted with piston rings, B_1, held in position in their grooves and prevented from revolving by means of small pins, placed at different position for each ring, so that the joints of the rings cannot work in line and allow the gases to blow past them. One end of the connecting-rod, C_1, is held to the piston by the wrist pin, B_6, which is rigidly fixed in the body of the piston. The other end of the connecting-rod engages the crank-pin, E. The horizontal, straight-line movement of the piston is thus transformed, by the pendulum motion of the connecting-rod, C, into rotary motion of the crankshaft, F. On this crankshaft, which is supported by the main bearings, F_2, is fixed the flywheel, F, which gives the engine a more regular and uniform motion. From the main shaft, F, by gear transmission, the cam or timing shaft, G, is driven, and upon this shaft are fixed the cams, G_1, for operating the inlet valve, H, and the exhaust valve, H_1. The cam shaft also operates the magneto shown in Fig. 19, which, at the proper instant, produces a spark at the terminals of the spark plug, J_1, in the combustion chamber of the cylinder, A. Power is distributed from the gas engine to the shafting belt or rope transmission from the flywheel, by geared drive from the main shaft, or by an electric generator may be mounted on an extension of the main shaft.



Horizontal, Four-Cycle, Single-Acting, Gas Engine, One Cylinder.

(E) *Single- and Double-Acting Engines.*—In a single-acting engine, Fig. 20, work is done at one end of the cylinder only, while the other, the crank end, is open and exposed to the surrounding air, thus giving a cooling effect. The piston usually serves as a cross-head. In a double-acting engine, Figs. 23 and 24, work is done at both ends of the cylinder. Here a stuffing box and a separate cross-head are necessary and the piston and its rod must be cooled. All modern small and medium-sized engines are of the single-acting type. Only in such cases where the highest possible cylinder capacity is required do manufacturers attempt to produce the double-acting engine. At the present time, the record capacity per cylinder of the double-acting two-cycle type is about 2,000 horse power; of the four-cycle, about 1,500 horse power.

(F) *Multi-Cylinder Arrangements.*— In the course of its development and branching out into the various fields of application, the internal combustion engine has been subjected to so many requirements and influenced by such factors as space, weight, uniformity of rotation, economy, reliability and flexibility, that it appears to-day in many types, the best known of which are given in diagrammatic form following (Figs. 20 to 31).

In Fig. 25, a rather peculiar type is illustrated, the Oechelhäuser-Junkers, single-acting, double-stroke, two-cycle engine. Two single-acting, opposed pistons, work in one cylinder provided with inlet and outlet slots. A transverse yoke and three connecting rods transmit the power developed in the cylinder to a three-throw crank shaft, thus freeing the cylinder of all stresses but those to the radial action of the combustion pressures. Furthermore, the engine is well balanced and therefore well suited for marine purposes.

It must be especially mentioned that the vertical, single-acting four-cycle, four and six cylinder, all in line, Figs. 26 and 27, as well as the eight cylinder, Fig. 31, and 12 cylinder, Fig. 35, V-type, the latter occasionally called the twin six, have become the most popular engine types in automobile, marine and aircraft practice. The reason for it is that these types give a more equal flow of power and weigh less per unit power than the one cylinder type. When the first automobiles in

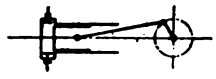


FIG. 20.— Single Acting, Four Cycle, One Cylinder.

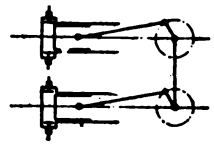


FIG. 21.— Twin, Single Acting, Four Cycle, Two Cylinder.

FIG. 22.— Tandem, Single Acting, Four Cycle, Two Cylinder.

FIG. 23.— Double Acting, Four Cycle, One Cylinder.

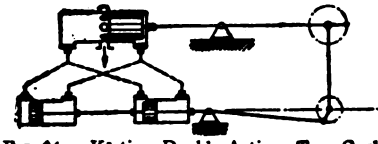


FIG. 24.— Körting Double Acting, Two Cycle, One Cylinder.

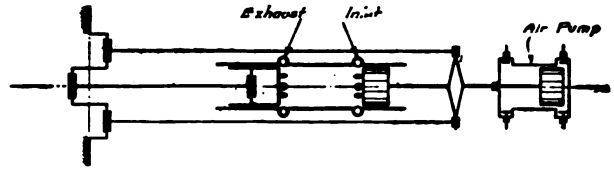
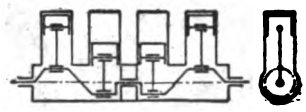
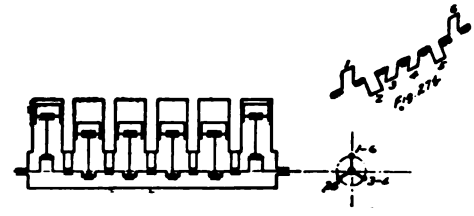


FIG. 25.— Oechelhaüeser-Junkers, Double Stroke, Single Acting, Two Cycle.



FIGS. 26, 26a. — Single Acting, Four Cycle, Four-Cylinder, All in Line.



FIGS. 27, 27a, 27b.— Single Acting, Four Cycle, Six Cylinder, All in Line.

FIG. 28.— Single Acting, Four Cycle, Two Cylinder, Opposed. (Completely Balanced).

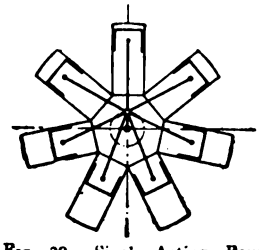


FIG. 29.— Single Acting, Four Cycle, Seven Cylinder (also Gnome Type).

FIG. 30.— Single Acting, Four Cycle, Five Cylinder, Fan Type.

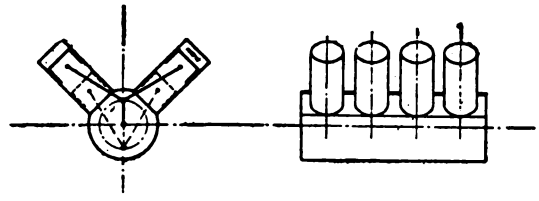
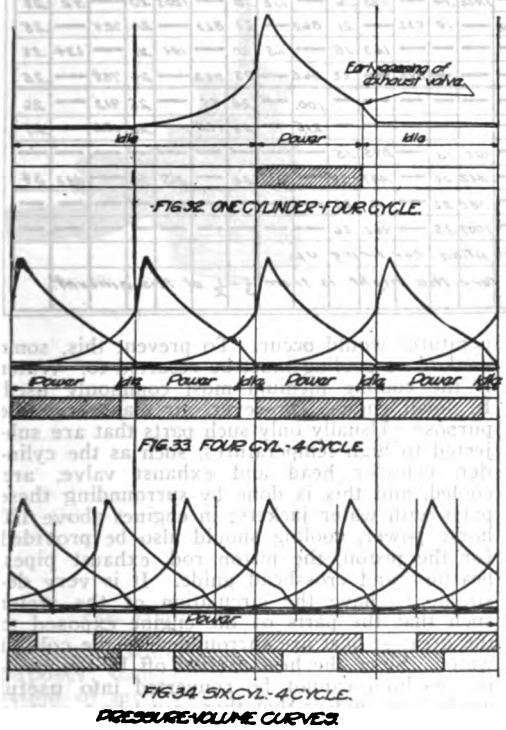


FIG. 31.— Single Acting, Four Cycle, Eight Cylinder, V-type.

America were made, the gasoline engine used for propelling it was of the one cylinder, four cycle, horizontal, slow speed type, Fig. 20. The heavy vibrations due to the irregular torque caused discomfort to the passengers and damage to the vital parts of the engine and vehicle. To avoid this, automobile designers have gradually adopted the vertical, high-speed, multi-cylinder type, in which the power is obtained by high rotative speed rather than by large bore and stroke. To illustrate this, in Figs. 32, 33 and 34 the pressure-volume curves have been drawn for four-stroke cycle engines of one, four and six cylinders, respectively. From these curves it is evident that in the one cylinder type the power impulse is followed by a long idle period; in the four cylinder engine a small gap only remains, due to the early opening of the exhaust valve, while in the six cylinder type the torque curves overlap, thus causing a continuous flow of power with no periods of



idling. This factor is a requisite in the operation of airplanes and very desirable in automobiles, since flexibility and performance of the motor is appreciated by any driver, especially in heavy traffic.

(G) *Main Dimensions of Internal Combustion Engines.*—Among the many methods of computing the main dimensions of the internal combustion engine, not one is wholly reliable or exact. The one giving the best practical results is that of a German authority, Hugo Gueldner. It is based on the practical amount of air, *Lh*, required in one hour, if the fuel consumption per hour is *Ch*, both *Lh* and *Ch* being in cubic feet for gaseous, and in pounds for liquid fuel. Using the former equation,

$$\eta_w = \eta_i \times \eta_m, \text{ we have}$$

$$\eta_w = \frac{N_e\, 33{,}000 \times 60}{Q\ 778}$$

$$\eta_w = \frac{N_e 2545}{C_h H}, \qquad \ldots\ldots (a)$$

where H is the lower heat value in British Thermal Units of the fuel consumed. Considering that the actual charge volume drawn in during one suction stroke consists of the fuel, $C_{st} = \frac{C_h}{30 \times n}$ and a corresponding amount of air, $L_{st} = \frac{C_h \times L}{30 \times n}$, the sum of the two, V_{st}, is equal to the piston displacement, $\frac{D^2\pi}{4} \times S$, times the volumetric efficiency, η_v, which is the ratio of the actual charge volume to the piston displacement volume. The equation for the determination of the main dimensions will then be

$$\frac{D^2\pi \times S}{4} = \frac{V_{st}}{\eta_v} = \frac{C_{st} + L_{st}}{\eta_v}.$$

From equation (a):

$$C_h = \frac{N_e \times 2545}{H \times \eta_w};$$

and from this we get $Lst = \frac{N_e \times 2545 \times L}{H \times \eta_w \times 30 \times n}$

or $\frac{D^2\pi}{4} \times S = \frac{84.8\ N_e\ (1+L)}{n \times H \times \eta_v \times \eta_w}$. Hence:

(b) . . . . . $D = \sqrt{\frac{108\ N_e\ (1+L)}{S\ n\ H\ \eta_v\ \eta_w}}$ = the effective diameter of the cylinder for a four stroke cycle engine, measured in feet, and

$$S = \frac{108\ N_e\ (1+L)}{D^2\ n\ H\ \eta_v\ \eta_w} = \text{stroke in feet;}$$

$$n = \frac{108\ N_e\ (1+L)}{D_2\ S\ H\ \eta_v\ \eta_w} = \text{number of revolutions}$$

per minute. For two cycle engines, it is obvious that the factor 54 would be used instead of 108. In the above equations L is the air in cubic feet actually used to burn one cubic foot of the gaseous, or one pound of the liquid fuel, while N_e is the effective horse power for one cylinder end only. In view of the amount of experimental data available, a selection of L, H and η_w can easily be made. For this purpose the tables 1 and 2 are inserted.

TABLE NO. 1. VOLUMETRIC EFFICIENCY.

from .93 to .88	for slow speed engines, mechanically operated inlet valve;
from .87 to .80	for slow speed engines, automatically operated inlet valve;
from .85 to .80	for high speed engines, mechanically operated inlet valve;
from .75 to .65	for high speed engines, automatically operated inlet valve;
from .65 to .50	for extremely high speed engines, automobiles and air-craft engines.

TABLE NO. 2

COLUMN NO	1		2		3		4			5			6			7			8			9		
FUEL	LOWER HEATING VALUE H B.T.U. PER		AIR REQUIRED Theoretically L_0 per		Actual L per		CONSUMPTION OF FUEL "C" PER B.H.P. PER Hr. ON THE BASIS OF THERMAL EFFICIENCY AT BRAKE η_w IF: N_e = 5 B.H.P			10 B.H.P			25 B.H.P			50 B.H.P			100 B.H.P			200 B.H.P		
							C		η_w	C		η_w	C		η_w	C		η_w	C		η_w	C		η_w
	Ft^3	lbs.	Ft^3	lbs.	Ft^3	lbs.	Ft^3	lbs.		Ft^3	lbs.		Ft^3	lbs.		Ft^3	lbs.		Ft^3	lbs.		Ft^3	lbs.	
I Illuminating gas																								
a. Lean	508	—	5.0	—	7.5	—	22.5	—	.22	20.7	—	.24	19.4	—	.26	18.8	—	.27	17.9	—	.28	17.4	—	.29
b. Ordinary	561	—	10	—	10	—	20.4	—	.22	18.6	—	.24	17.2	—	.26	16.9	—	.27	16.1	—	.28	15.6	—	.29
c. Rich	618	—	6.0	—	9.0	—	18.6	—	.22	17.2	—	.24	15.8	—	.26	15.4	—	.27	15.1	—	.28	14.3	—	.29
II Producer gas	674	—					17.0	—	.22	15.8	—	.24	14.3	—	.26	14.0	—	.27	14.3	—	.28	13.1	—	.29
a. On basis of anthracite	—	1650	—	—	—	—	—	—	—	—	1.296	.15	—	1.18	.17	—	1.005	.19	—	.895	.21	—	.85	.22
b. Anthracite gas	140	—	9-11	—	1.5	—	—	—	—	96.8	—	.19	86.0	—	.21	78.9	—	.23	75.2	—	.24	71.8	—	.26
c. On basis of coke*	—	1500	—	—	—	—	—	—	—	—	1.452	.14	—	1.25	.16	—	1.12	.18	—	1.005	.20	—	.92	.22
d. Coke gas	129	—	85-11	—	1.25	—	—	—	—	104	—	.19	93.2	—	.21	860	—	.23	82.3	—	.24	78.9	—	.25
e. On basis of lignite bits	—	8670	—	—	—	—	—	—	—	—	—	—	—	1.63	.18	—	1.45	.20	—	1.44	.21	—	1.34	.22
f. Lignite gas	129	—	9-10	—	1.3	—	—	—	—	—	—	—	89.6	—	.22	86.0	—	.23	82.3	—	.24	78.9	—	.25
III Blast furnace gas	106	—	35	—	9-1.	—	—	—	—	—	—	—	—	—	—	100.	—	.24	95.	—	.25	91.3	—	.26
IV Coke oven gas	505	—	5.3	—	7.	—	—	—	—	—	—	—	—	—	—	215	—	.23	19.8	—	.26	18.6	—	.27
V Kerosene equiv.	—	19700	—	185	—	[336-355	—	1.117	.12	—	103	.13	—	.895	.15	—	—	—	—	—	—	—	—	—
VI Crude Oil - diesel	—	18000	—	176	—	[288-320	—	.54	.26	—	498	.29	—	.447	.32	—	.425	.33	—	.415	.34	—	.413	.34
VII Gasoline benzol	—	18000	—	185	—	[240-272	—	.465	.20	—	.588	.22	—	.536	.23	—	—	—	—	—	—	—	—	—
VIII Alcohol - 90%	—	10000	—	96.5	—	[120-192	—	1.07	.23	—	1.007	.25	—	.962	.26	—	—	—	—	—	—	—	—	—

* Including 10-15% of the full daily fuel consumption for firing up.

The consumption of a gas-producer banked thru the night is from $\frac{1}{3}$-$\frac{1}{2}$ of this amount.

Example.—A four-cycle, single-acting, one-cylinder anthracite producer gas engine is to develop 170 horse power, at a piston speed of 800 feet per minute and a stroke-diameter ratio $\frac{S}{D} = 1.35$. What are its main dimensions?

Solution.— From Table No. 1 use $\eta_v = .90$;
From Table No. 2 use $\eta_w = .26$;
$H = 140$ B. T. U.
$L = 1.5$ cube feet.

And since $n = \frac{C}{2S} = \frac{800}{2.7D} =$ Revolutions per minutes.

These values substituted in equations (b) and solving for $D = \sqrt{\frac{108 \times N_e (1+L)}{S \times n \times H \times \eta_w \times \eta_v}} =$

$$\sqrt{\frac{108 \times 170(1+1.5) \times 2.7}{1.35 \times 800 \times 140 \times .26 \times .9}} =$$

1.877 feet = 22.5 inches.

$S = 1.35 \times 22.5 = 30$ inches.

$n = \frac{800}{2 \times 30} = 166$ Revolutions per minute.

3. Cooling.— The maximum temperature developed within the cylinder of internal combustion engines is 2,500° F., or more. It is evident that neither cast iron and cast steel nor any other metal known at the present time could resist such high temperatures. Furthermore, pre-ignition of the charge and distortion of the elements exposed to such high temperatures would occur. To prevent this, some method of cooling must be resorted to. Water is the cooling medium most commonly used. In small engines, however, air may serve the purpose. Usually only such parts that are subjected to high temperatures, such as the cylinder, cylinder head and exhaust valve, are cooled, and this is done by surrounding these parts with water jackets; in engines above 120 horse power, cooling should also be provided for the piston, the piston rod, exhaust pipes, bearings and crosshead guide. It is very desirable to have the circulation of the water such that the parts of the engine exposed to the greatest heat are surrounded by the coldest water. Since the heat carried off by the cooling medium cannot be converted into useful work, it is evident that there must be a certain loss due to this cooling of the engine. The amount of this loss, see Fig. 17, depends on many factors, such as type and load of engine, size of cylinder, temperature of cooling water, and so on, and varies from 25 per cent to 50 per cent of the heat developed within the cylinder. However, there is danger from over-cooling as well as from under-cooling. If the engine is over-cooled, the clearance between the piston and cylinder is decreased, the lubricating oil gets more sluggish, and there will be a large increase in mechanical friction, with a corresponding decrease in mechanical efficiency. On the other hand, if the engine is not sufficiently cooled, there is danger from pre-ignition, excessive expansion of parts, and at very high temperatures, actual failing of the cylinder and piston.

Each of the cooling systems has its advantages and disadvantages. The main advantages of air cooling are simplicity, light weight, no charge for the cooling medium, and no danger of cracking the cylinder by freezing; the disadvantages which may be cited are applicability to small engines only, no positive control over the temperature, burning of the cylinder lubricating oil, and in most cases high fuel consumption. In the standard method of water cooling, we have such advantages as the control of the temperature regardless of weather conditions, the possibility of cooling internal parts of large engines and the regulation of the clearance space between the cylinder and piston, which in turn means the partial control of the piston friction and also the prevention of the escape of gases into the engine room. On the other hand, there are certain disadvantages of the water-cooled engine. There is an increase in weight which is a most undesirable feature in engines for automotive purposes; danger of freezing in winter; collection of mud and formation of scale which will clog up the water passages; and the failure of the feed pump where forced circulation is used.

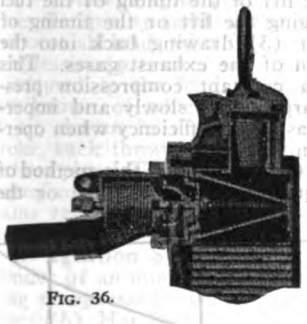


FIG. 36.

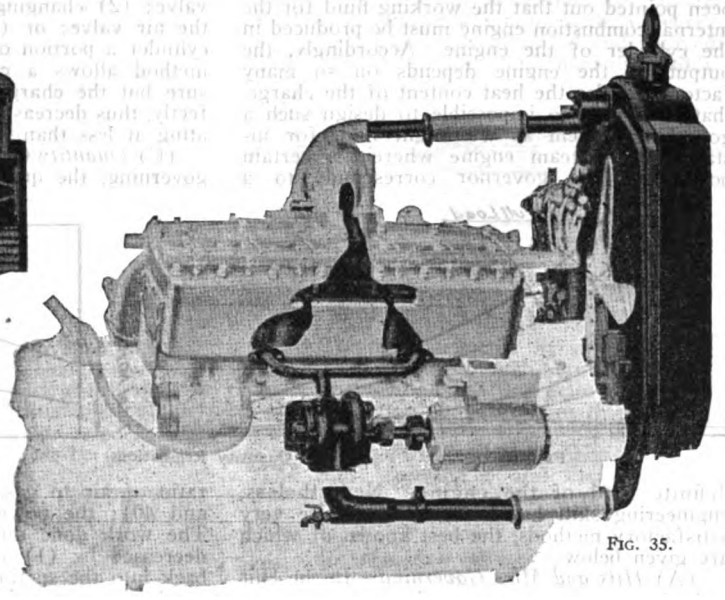


FIG. 35.

FIGS. 35 and 36.—Water Circulating System of Packard 12 Cylinder "V" Type Automobile Engine.

In automobiles, trucks, tractors and airplanes, it is necessary to reclaim the water. In this case the water is circulated through a so-called radiator, Fig. 35.

This consists either of a great number of round tubes with fins to radiate the heat, or flat tubes through which the water flows in thin sheets. In addition, air is forced against these tubes by the forward movement of the vehicle and by a fan. The water, forced by means of a small pump into the jacket of the cylinder, gradually becomes warmer while passing upward, and finally is discharged into the top of the radiator. There it is divided into thin streams and directed against comparatively cold metal which abstracts heat from the water. Gradually cooling off, it flows down through the radiator to the suction pipe of the pump (illustrated in Fig. 35), which again forces it back into the jacket. A thermostat may be added (see Fig. 36), and the flow of the water so regulated that the temperature of the water is constant at all speeds of the engine. Some manufacturers do not use a pump at all, but resort to the natural method of water circulation — the thermo-syphon system — which, however, requires a larger amount of water and space.

Small and medium sized stationary engines are provided with a large water tank (see Fig. 18); the top of the tank is connected with the top of the water jacket, and the bottom of the tank with the bottom of the jacket. In small farm engines, this tank is an integral part of the cylinder jacket, thus eliminating piping entirely. In large, high-powered engines, the quantity of cooling water generally varies from 30 to 70 pounds per horse-power hour, depending upon the type and fuel used. A 6,000 horse-power engine would therefore require about 420,000 pounds of water per hour. Where such a quantity of clean water cannot be secured at a very low cost, the cooling water must be reclaimed. In the simplest design, the hot water is piped to a cooling pond where the heat is dissipated by radiation and evaporation. In such plants where ground area is limited, the pond is generally displaced by a cooling tower.

For all cases cited above, the cooling water must be clean, for if impurities settle in the water jacket, the cooling, especially of the cylinder walls, becomes defective, the temperature rises, and pre-ignition, caused by incandescent deposits of carbon within the combustion chamber, is likely to occur. Again, the film of lubricating oil between the piston, piston rings and cylinder walls is rendered so thin

that it loses its sealing power; the exploding gases then blow past the piston rings and the oil is burned and charred, thus destroying its lubricating value. Heavy wear, loss of power and even "freezing" of the parts are the inevitable results.

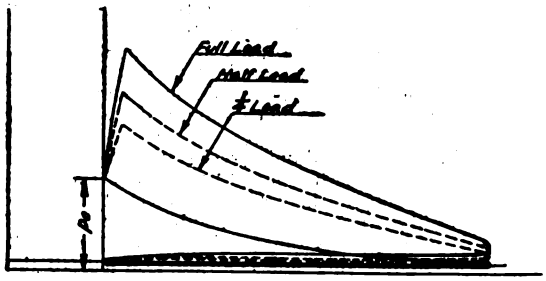


FIG. 37. Quality Regulation.

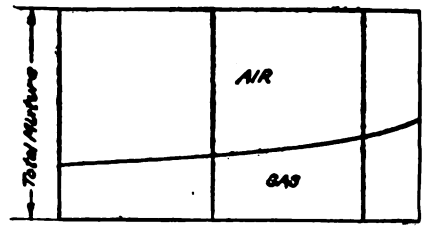


FIG. 38.

4. **Governing Methods.**— It has already been pointed out that the working fluid for the internal combustion engine must be produced in the cylinder of the engine. Accordingly, the output of the engine depends on so many factors, besides the heat content of the charge, that it is next to impossible to design such a governing system as we might find, for instance, in a steam engine wherein a certain position of the governor corresponds to a definite load of the engine. Nevertheless, engineering skill has managed to devise very satisfactory methods, the best known of which are given below.

(A) *Hits and Miss Governing.*—In the "hit and miss" type of governing, the engine operates under a constant quality and constant quantity charge. Explosions are cut out at irregular intervals by keeping either the gas inlet valve closed or the outlet valve open. Although the method is to be noted for its economy and simplicity, it is used only in small and medium sized engines and in such cases where an irregular speed of rotation is permissible.

(B) *Quality Governing.*— The quantity of the charge in this method is constant (see Figs. 37 and 38), and the power stroke occurs regularly; but here the impulse is diminished by lowering the quality of the charge or the mixture ratio of fuel to air. This is effected by (1) changing the lift or the timing of the fuel valve; (2) changing the lift or the timing of the air valve; or (3) drawing back into the cylinder a portion of the exhaust gases. This method allows a constant compression pressure but the charge burns slowly and imperfectly, thus decreasing the efficiency when operating at less than full load.

(C) *Quantity Governing.*—In this method of governing, the quality of the mixture or the ratio of air to gas, is constant (see Figs. 39 and 40); the power stroke occurs regularly. The work done during the impulse stroke is decreased by (1) forcing part of the charge back into the suction pipe; (2) earlier cut-off of the incoming charge; or (3) throttling of the charge during the suction stroke. Although in this system the compression pressure, and consequently the efficiency drop (see Fig. 40), the mechanical efficiency increases with the decrease of the output. In practice, quantity governing proves to be superior to quality governing.

(D) *Combination Quality — Quantity Governing* (illustrated in Figs. 41 and 42), is

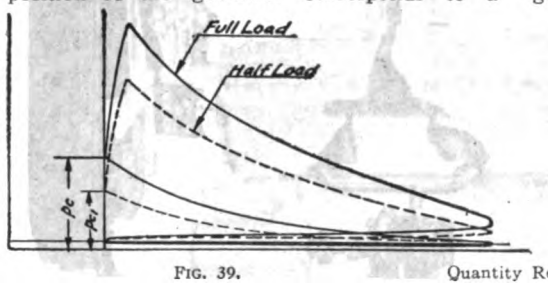


FIG. 39. Quantity Regulation.

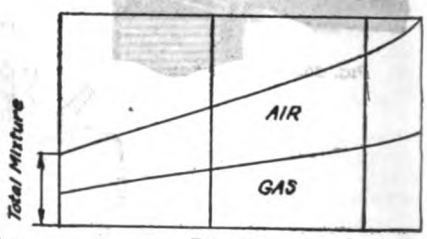


FIG. 40.

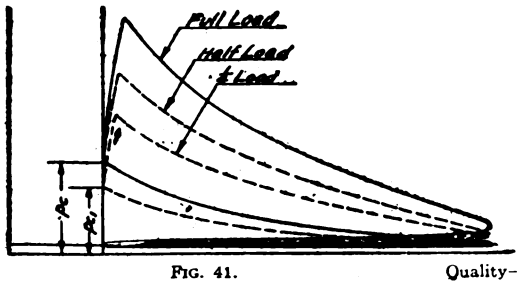


FIG. 41. Quality-Quantity Regulation.

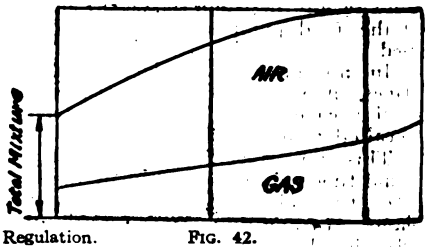


FIG. 42.

effected by using between maximum and half the load, the quality, and below half the load, the quantity method, thus combining the good features of these two methods.

(E) *Automotive Engines,* if running on light oil, such as gasoline, are generally governed by

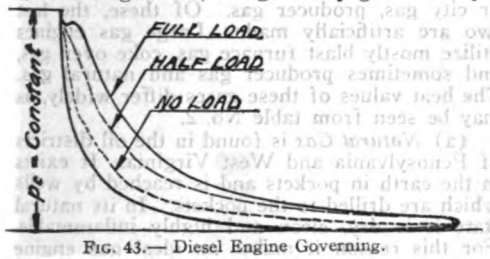


FIG. 43.— Diesel Engine Governing.

throttling the charge, and varying the time of ignition.

(F) *Diesel Engine* governing differs slightly from the quality method above. The engine works at all loads with full air charge and full compression pressure, but the amount of oil is adapted to the load in different ways, the best known of which is to force the surplus of oil, drawn in during the constant suction stroke, back through the suction valve into the suction pipe. The suction valve is under the control of the governor. Pressure-volume diagrams regulated by this method are shown in Fig. 43.

5. Ignition Systems.— The charge in the cylinder of an internal combustion engine, after being compressed, may be ignited by (a) Hot Tube; (b) Hot Bulb; (c) High Compression; (d) Electric Spark. The ignition point should be surrounded by a pure charge, and located in the centre of the combustion chamber which, for best economy, should be spherical in shape. The time of ignition must be adjustable. When the combustion chamber is annular or pocketed, two or more ignition points must be provided to get good combustion.

In the hot tube ignition system (see Fig. 44),

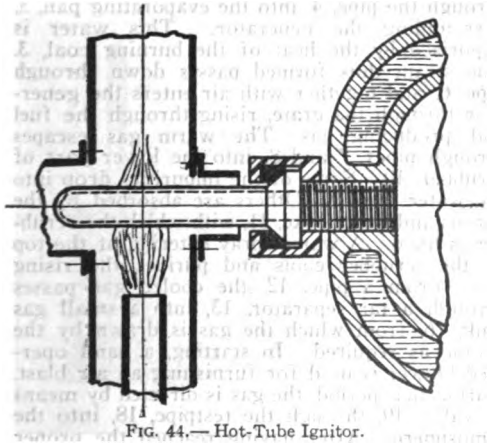


FIG. 44.— Hot-Tube Ignitor.

a small tube of nickel, platinum or porcelain about three inches long and about one-quarter inch bore is fixed to the combustion chamber; the tube is heated by an external heat source. During the compression stroke, the charge is forced gradually into the tube, and as soon as it reaches the glowing zone, ignition occurs. Timing is effected by shifting the external heat well. This method is very simple and effective, but its short life and external flame carrier soon caused it to be displaced by fuller ignition systems.

In the hot bulb system (see Fig. 8), a spherical or oval-shaped cast iron bulb serving as combustion chamber is fixed to the cylinder. It is heated by an external flame only for starting, and as long as the engine is cold. This method is very successfully used in oil engines. The fuel is sprayed into the bulb during the suction stroke in four stroke cycle engines, and during the compression stroke in two stroke cycle engines. There it is vaporized and then ignited by the compression temperature. In most cases timing is controlled by spraying water, in proper quantities, into the bulb.

In the high compression system of ignition such as we find in the Diesel engine, pure air is compressed to about 500 pounds per square inch, thus heating the air to such a degree that any oil, if properly atomized and sprayed into the cylinder at the right moment, readily

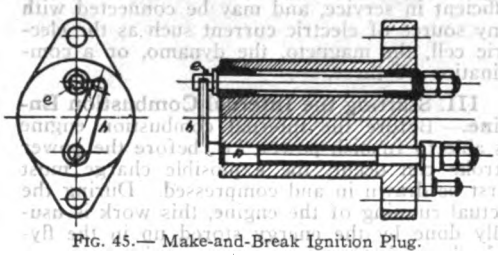


FIG. 45.— Make-and-Break Ignition Plug.

ignites. Timing is effected by adjusting the spray-needle valve. Although very efficient and reliable, this method has one main drawback: for the production and storage of the spraying air, an air-compressor and high pressure storage tanks with their piping are necessary.

The most convenient and clean ignition system for gas and gasoline engines is that

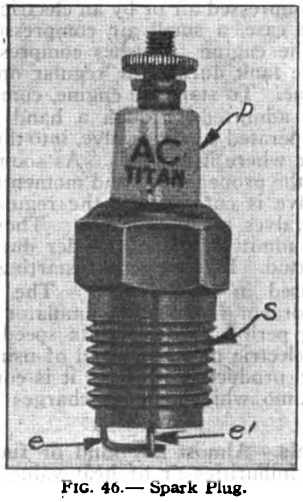


FIG. 46.— Spark Plug.

using the electric spark. Of this system there are two types: the low tension or break contact type (see Fig. 45) and the high tension or jump spark system (see Fig. 46). The former

involves the motion of a rocker-shaft, *n*, with a contact hammer *h*, acting on a stationary electrode, *e*. The two parts coming together are necessarily subject to wear, which thus prevents the formation or deposit of carbon on the contact faces; in this way the gases have free access to the spark at the moment of break of contact and this system is well suited for large low speed engines where a hot, "fat," spark is most desirable.

The jump spark igniter (Fig. 46), called the spark plug, has no moving parts. It consists of a shell, *s*, containing *e*, one of the electrodes, screwed into the combustion chamber wall, and a porcelain insulator, *p*, carrying in its centre the second electrode, *é*. The two electrodes must have a proper gap, about one-thirty-second inch, and be soot proof. To jump this gap, the electric current must have a high pressure, about 10,000 volts, produced by a secondary or induction coil, and a breaking device in the primary coil. Thus the jump spark has electrical complication and mechanical simplicity, while the break spark has mechanical complication and electrical simplicity. They are, however, equally efficient in service, and may be connected with any source of electric current such as the electric cell, the magneto, the dynamo, or a combination of these.

III. Starting the Internal Combustion Engine.— Before the internal combustion engine is able to furnish power, i.e., before the power stroke can occur, the explosible charge must first be drawn in and compressed. During the actual running of the engine, this work is usually done by the energy stored up in the flywheel; with the engine at rest, however, no energy is available from the wheel. Hence, to start the engine, an external power source is necessary. Small engines working with low compression pressure may be started by hand. Nothing more than a hand crank is used for this. It is attached directly to the crankshaft. High-powered engines and those working on high compression pressures may be started either by compressed air or by an electric motor. In the first case, a small air compressor connected to the engine furnishes compressed air to a storage tank during the regular operation of the engine. To start the engine, compressed air is then admitted, through a hand or mechanically operated starting valve, into the working cylinder where it expands. As soon as the engine has the proper speed and momentum, the starting valve is cut out and the regular inlet and outlet valves set in operation. There must be no fuel admitted to the cylinder during the starting period. Electric motor starting is extensively used in automobiles. The electric current is drawn from an accumulator during the starting period. At a certain speed of the engine the electric motor, instead of using electric current, produces it, that is, it is converted into a dynamo which again recharges the accumulator.

IV. Fuels.—Almost any kind of fuel, irrespective of impurities or of heat value, can be utilized in the internal combustion engine today. Fuel gases and fuel oils form ready mixtures with air and burn without considerable residue. Where gas is not available as a natural product or as the main or by-product of the industry, it can be economically produced from solid fuel in a special apparatus called a producer.

(A) Gaseous Fuels.— Small and medium-size gas engines are operated by one of the following kinds of gas — natural gas, illuminating or city gas, producer gas. Of these, the last two are artificially made. Large gas engines utilize mostly blast furnace gas, coke oven gas, and sometimes producer gas and natural gas. The heat values of these gases differ widely, as may be seen from table No. 2.

(a) *Natural Gas* is found in the oil districts of Pennsylvania and West Virginia. It exists in the earth in pockets and is reached by wells which are drilled to the pockets. In its natural state it is dry, clean and highly inflammable. For this reason it makes an ideal gas engine fuel when it can be obtained at low cost.

(b) *City Gas* is made from bituminous coal by dry distillation. After impurities, such as tar, have been carefully removed, it makes an excellent fuel for gas engines up to 50 horse power.

(c) *Producer Gas* can be manufactured from almost any kind of fuel, such as anthracite coal, bituminous coal, coke, lignite, wood refuse and peat. If the engine "draws" from the gas producer the gas required for its operation, the gas is called *Suction Producer Gas*. If air and steam are "blown" into the producer, and the gas thus made is under pressure, the latter is termed *Pressure Producer Gas*. Suction gas producer plants are by far in the lead in the United States and are mostly operated by anthracite. Their size rarely exceeds 200 horse power. The suction producer gas is cheaper than city gas, but on the other hand contains impurities which are liable to cause trouble in the operation of the plant. In Fig. 47 the construction of a suction producer plant is illustrated.

Air is drawn in through the generator, 1, filled with fuel, 3, the lower position of which is incandescent over the grates, 2. Water passes through the pipe, 4, into the evaporating pan, 5, surrounding the generator. This water is vaporized by the heat of the burning coal, 3. The steam thus formed passes down through pipe, 6, and together with air enters the generator through the grate, rising through the fuel and producing gas. The warm gas escapes through pipes, 7 and 8, into the lower part of scrubber, 10. Some of the impurities drop into the water trap, 9. Others are absorbed by the porous and bulky coke, 11, with which the scrubber is filled. A water spray entering at the top of the scrubber cools and purifies the rising gas. From a pipe, 12, the cooled gas passes through a tar separator, 13, into a small gas tank, 16, from which the gas is drawn by the engine as required. In starting, a hand operated blower is used for furnishing an air blast. During that period, the gas is directed by means of valve, 19, through the testpipe, 18, into the atmosphere. After having reached the proper quality, the gas is directed to the scrubber by turning the valve, 19, into the position shown.

Pressure producer gas plants range from 200 to 2,000 horse power. Mostly bituminous coal or lignite is used as fuel. The cleaning apparatus of such a plant must be more effi-

cient than in the suction producer gas plant. In larger plants it is very economical to install a by-product plant for the treatment of the tar from which sulphate of ammonia and other products are obtained, thus helping to lower

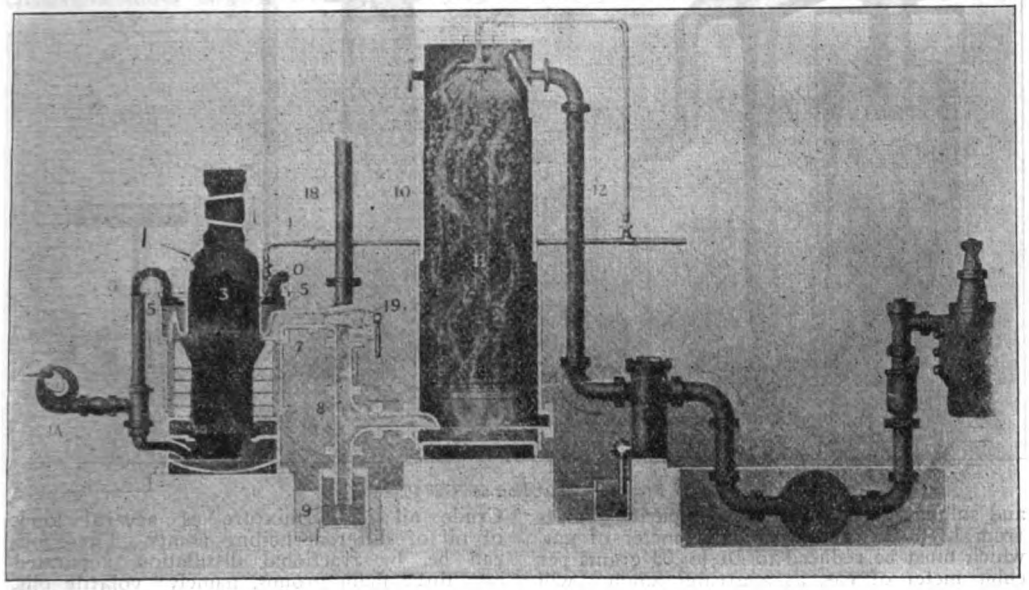


FIG. 47.— Suction Producer Gas Plant.

the cost of operation. Figure 48 illustrates a typical pressure producer gas plant.

Steam is produced in a separate boiler, 19, from which it passes through pipe 6 into pipe 5 were it is mixed with air, previously heated in

sprayed over the coke, cooling and purifying the rising gas. Through pipe, 12, the gas passes first through the tar separator, 13, then the drying filter, 14, filled with sawdust, and finally, after having gone through a second tar separator, 15, enters the gas tank, from which it flows, under slight pressure, to the engine. In case of a lignite plant, a steam boiler is not necessary, as the lignite contains sufficient moisture.

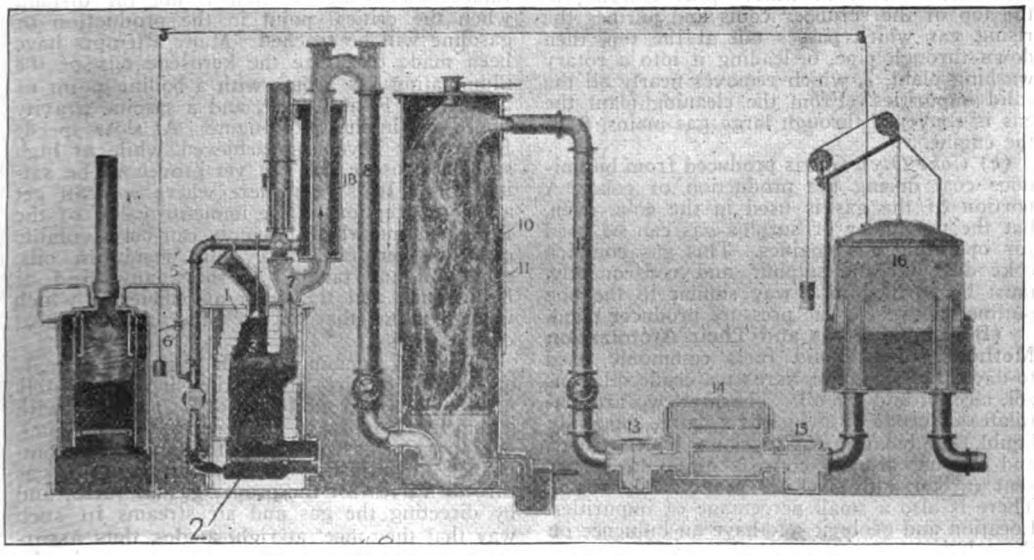


FIG. 48.— Pressure Producer Gas Plant.

tank, 1B. Steam and air together enter the generator, 1, through the grate 2. Rising through the incandescent fuel, 3, they form gas which is forced through pipes 7 and 8 into the scrubber, 10, filled with coke. Cold water is

(d) *Blast Furnace Gas.*—A blast furnace is, with regard to the production of gas, a huge pressure gas producer. The gas coming from the blast furnace contains a great quantity of impurities such as limedust, iron oxide, soot

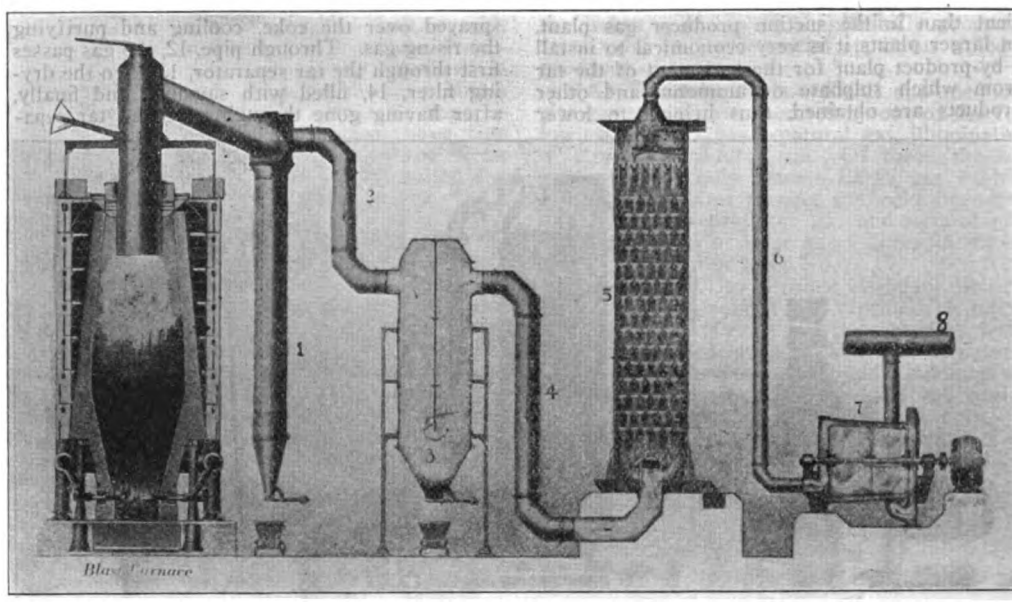


FIG. 49.— Blast Furnace Gas Plant.

and sulphur. The quantity of impurities varies from 12 to 25 grams per cubic meter of gas, which must be reduced to .01 to .03 grams per cubic meter of gas, as a greater amount will cause deposits in the engine cylinder, excessive wear of the moving parts and danger to the engine. A blast furnace gas cleaning plant is illustrated in Fig. 49.

After leaving the dust trap, 1, the gas passes through the pipe, 2, to a larger dust catcher, 3, continuing through pipe, 4, to the scrubber, 5. A cold water spray entering at the top of the scrubber cools and purifies the rising gas which passes out at the top, then down through pipe, 6, leading it into a rotary washing plant, 7, which removes nearly all the solid impurities. From the cleaning plant the gas is conveyed through large gas mains, 8, to the engine.

(e) *Coke Oven Gas* is produced from bituminous coal during the production of coke. A portion of the gas is used in the coke oven, but the remainder or surplus gas can be used for operating gas engines. This gas contains coke dust, tar and sulphur, and, consequently, must be purified in a way similar to the one outlined above for the pressure producer plant.

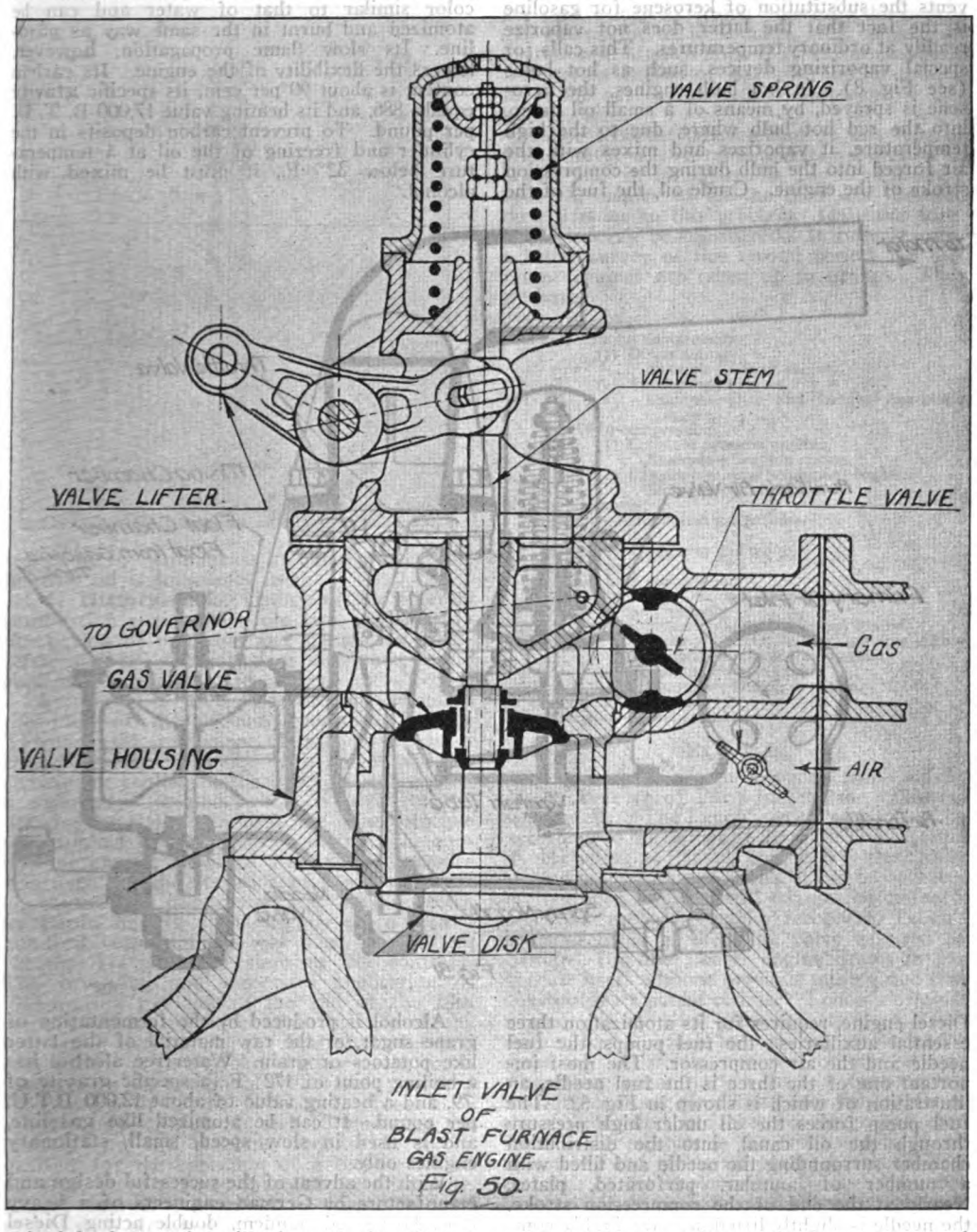
(B) Liquid Fuels and Their Atomization Methods.— The liquid fuels commonly used to-day are: Gasoline, kerosene, crude oil, benzol, alcohol and tar oil. The first two are distillates of crude oil, which is a native, generally liquid, combination of various hydrocarbons and as such usually consists of 80 to 85 per cent carbon and 15 to 20 per cent hydrogen. There is also a small percentage of impurities. Location and geologic age have an influence on the relative proportions of the constituents, as may be seen from the following analyses:

	Carbon, %	Hydrogen, %	Impurities, %	Heating value B. T. U.	Specific gravity at 32°
Heavy crude, West Virginia.....	83.5	13.3	3.2	18,324	.873
Heavy crude, Pennsylvania...	84.9	13.7	1.4	19,210	.886

Crude oil is a mixture of several kinds of oil of different boiling points. These oils can be, by fractional distillation, separated into three main groups, namely: volatile oils, 10 per cent; illuminating oils, 80 per cent; and heavy oils. The first group contains besides other oils, gasoline with a boiling point of 160° to 200° F. and a specific gravity of .65 to .70. It is gasoline on which Otto engines, especially of the high speed automotive type, operate so successfully. With the number of automobiles rapidly increasing the time is not far distant, when the critical point in the production of gasoline will be reached. Many attempts have been made to utilize the kerosene oils of the illuminating gas group, with a boiling point of about 300° F. and more, and a specific gravity of .78–.86, in the Otto engine. At slow speeds fair results have been achieved, while at high speeds kerosene has not yet proven to be satisfactory. It is right here where we can get a true conception of the immense value of the Diesel engine which not only can burn volatile oils, but kerosene, heavy oils, residuum oils, crude oil and tar oil, in short, any kind of liquid fuel, and this with an efficiency which is high above that of any other type of heat engine.

For best economy of the fuel, i.e., for its quick and complete combustion, it is absolutely necessary to surround each of its particles with a sufficient number of air particles. In engines, operating on gaseous fuels, this may be accomplished by adjusting the air throttle and gas throttle valves for the proper gas-air ratio, and by directing the gas and air streams in such way that they meet at right angles, thus assuring a thorough mixing of the gas with the air. This is illustrated in Fig. 50. To accomplish the same aim with liquid fuel, the latter must be first atomized, assuring a more thorough amalgamation of the oil and air particles. Although almost any device which permits a current of air to pass over or through a volatile oil will serve the purpose, modern

gasoline-air mixing devices, termed carburetors, are called upon to deliver a mixture to the cylinders, which is not only of accurate proportion, but also of proper composition at all engine speeds. The details of the modern carburetors differ largely, yet the underlying principle is mostly still that of the pioneer "*spray-jet*" automatic float feed carburetor evolved by Maybach about 35 years ago. A single spray-jet automatic float feed carburetor as used by the Packard Motor Car Company of Detroit is illustrated in Fig. 51. Gasoline flows into the float chamber through a needle valve. A constant height of the gasoline in the spray-nozzle connected with the float chamber is automatically maintained by the float. The suction created by the pistons causes air to enter the mixing chamber through the primary and auxiliary air inlets. In passing through the venturi tube the primary air assumes a speed of more than 7,000 feet per minute. It consequently draws gasoline from the spray-nozzle and atomizes it. The proper gasoline-air mixture, at all engine speeds, is maintained by the auxiliary air valve, the lift of which increases with the vacuum in the mixing chamber or with



INLET VALVE OF BLAST FURNACE GAS ENGINE
Fig. 50.

the speed of the engine. Many attempts have been made to atomize kerosene by the methods described above, but they failed entirely in high speed engines. In small, slow speed, stationary engines, kerosene can be used with a fair degree of success. The chief difficulty which prevents the substitution of kerosene for gasoline is the fact that the latter does not vaporize readily at ordinary temperatures. This calls for special vaporizing devices, such as hot bulbs (see Fig. 8). In hot bulb engines, the kerosene is sprayed, by means of a small oil pump, into the red hot bulb where, due to the high temperature, it vaporizes and mixes with the air forced into the bulb during the compression stroke of the engine. Crude oil, the fuel of the countries, where gasoline and even crude oil are at a premium, benzol, alcohol and tar oil have come into extensive use. Benzol, a by-product in the manufacture of illuminating gas and coke is in its crude form a foul-smelling liquid. After the refining process it has a color similar to that of water and can be atomized and burnt in the same way as gasoline. Its slow flame propagation, however, lowers the flexibility of the engine. Its carbon content is about 90 per cent, its specific gravity equals .886, and its heating value 17,000 B. T. U. per pound. To prevent carbon deposits in the cylinder and freezing of the oil at a temperature below 32° F., it must be mixed with alcohol.

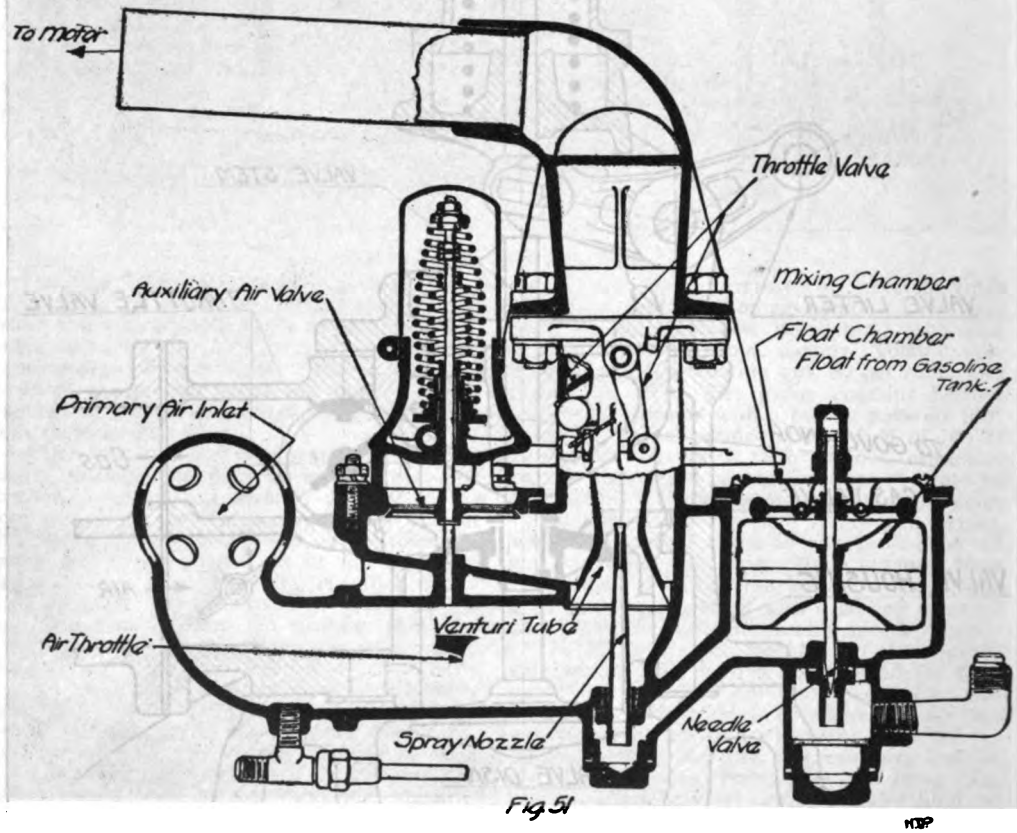


Fig. 51

Diesel engine, requires for its atomization three essential auxiliaries: the fuel pumps, the fuel needle and the air compressor. The most important one of the three is the fuel needle, an illustration of which is shown in Fig. 52. The fuel pump forces the oil under high pressure through the oil canal, into the distribution chamber surrounding the needle and filled with a number of annular, perforated, plates. Nearly at the end of the compression stroke, the needle is slightly lifted, and the highly compressed air, furnished by an air compressor through the air canal, forces the oil through the spray nozzle at a very high speed into the combustion chamber where a thorough mixing of the oil and air particles takes place. Hence the needle valve has two main functions: the distribution and the atomization of the oil. In

Alcohol is produced by the fermentation of grape sugar, or the raw material of the latter like potatoes or grain. Waterfree alcohol has a boiling point of 172° F., a specific gravity of .79, and a heating value of about 12,000 B.T.U. per pound. It can be atomized like gasoline, and is used in slow speed, small, stationary engines only.

With the advent of the successful design and manufacture by German engineers of a heavy type, horizontal, tandem, double acting Diesel engine, a new fuel has entered the market, tar oil. Of what importance this fuel is may be seen from that fact that Germany uses more than 500,000 tons a year in stationary engines. Tar oil is like benzol, a by-product in the manufacture of coke and gas. Its boiling point is about 600° F., its specific gravity about 1.05

and its heating value about 17,000 B.T.U. per pound. All parts of the engine coming in contact with this fuel, like the fuel pump and spray needle valve, must be made of special material, as ordinary steel will be easily destroyed by it. To increase its flame propagation, ignition oil is sometimes used.

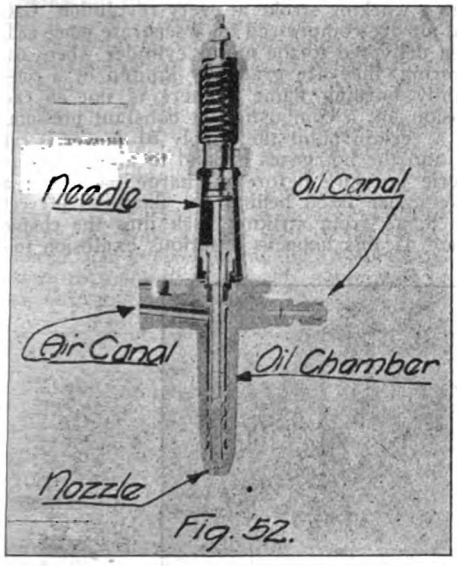


Fig. 52.

V. History.— The history of the internal combustion engine falls into two periods: (1) the period of invention and speculation, 1678–1860; and (2) the period of development and application, 1860 to date.

As early as 1678, Hautefeuille advanced the idea of the vacuum gun-powder pump. Through the explosion of gunpowder in a closed chamber provided with valves and the subsequent cooling of the gases of combustion, a vacuum is created, which is used for the drawing of water. In 1680, the same principle was applied by Huyghens in his vacuum gun-powder engine, in which atmospheric pressure was used for the operation of a piston. Such an engine was constructed and actually tested by Papin in 1688. For slightly more than a hundred years nothing was done, at least no records are available showing the contrary. The invention and successful application of illuminating gas toward the end of the 18th century seems to have again stimulated the interest of inventors in the field of the internal combustion engine. John Barber took out a patent on a gas turbine in 1791. Gases produced from solid or liquid fuels and mixed in a special chamber with air and a little water are ignited and the resulting impulse is to be utilized for the operation of a turbine wheel. In 1794, Robert Street invented the oil engine. Liquid fuel is evaporated in a cylinder and mixed with air taken in during the first half of the stroke. The mixture is ignited by a continuously burning ignition flame at the middle of the stroke and the piston is driven outward by the gases. From 1800 to 1860 many inventions along the internal combustion engine line have been made the most important of which are: the double acting illuminating gas engine of Lebon, 1801; the double acting explosion engine of Wright, 1833; the explosion engine with compression of Barnett, 1838; the hot tube engine of Drake, 1842, exhibited in Philadelphia in 1847 and having an output of 20 horse power at 60 R.P.M. and 103 pounds per square inch explosion pressure; the hydrogen gas engine of Reithmann, 1852, actually in operation in Munich until 1858; the atmospheric free piston engine of Barsanti and Matteucci, 1854; the gas engine with compression of Degrande, 1858.

Since 1860 the development of this type of prime mover was so rapid and its application so broad that it is impossible to mention here even the names of all the men who devoted their lifetime to this problem. Only the foremost ones can be considered. In order to give a better survey of this second period, the different engines are taken up in groups. Thus we have:

A. Gas Engines.
  (a) Without compression.
    (1) Direct acting.
      Example—Lenoir engine.
    (2) Atmospheric engines.
      Example—Otto and Langen free piston engine.
  (b) With compression.
    (1) Constant pressure engines.
      Example—Brayton engine.
    (2) Constant volume (explosion) engine.
      Example—Otto engine.

B. Gas Turbines.
  Example—Holzwarth gas turbine.

C. Gas Pumps.
  Example—Humphrey gas pump.

D. Oil Engines.
  (a) Without compression.
    Example—Otto and Langen engine.
  (b) With compression.
    (1) Constant volume (explosion) engine.
      Example—Otto-Daimler gasoline engine; standard automobile engine.
    (2) Constant pressure engine.
      Example—Diesel oil engine.

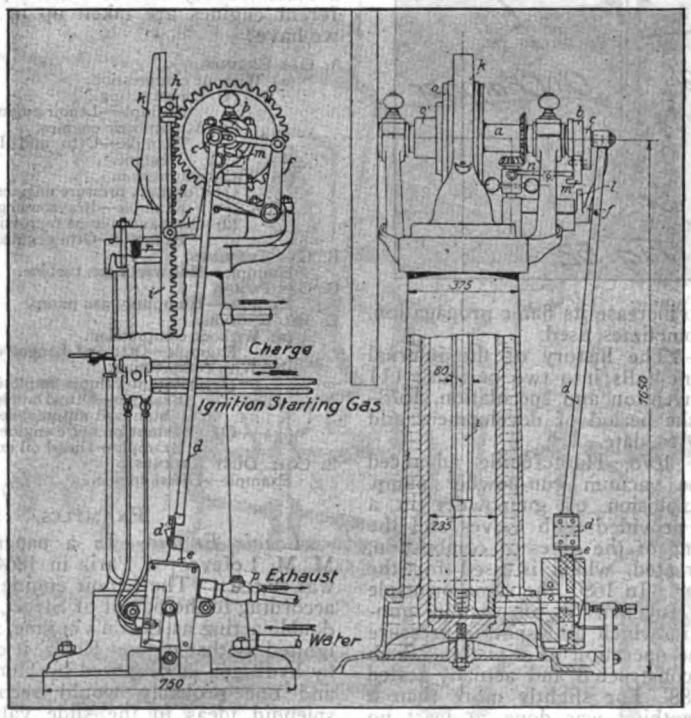
E. Coal Dust Engines.
  Example—Diesel engine.

Examples.

Lenoir Engine.— In a paper published by M. M. Lefevre of Paris in 1864 the following was stated: "The Lenoir engine uses the piston according to the patent of Street, it is direct and double acting as Lebon's engine, it is electrically ignited as that of von Rivaz, it can be operated by hydrogen as proposed by Herskine-Harzard, and one probably would recognize Talbot's splendid ideas in the slide valve as used by Lenoir. But the Lenoir engine draws in gas and air itself without previous mixing and that constitutes its patent claims." Lenoir's original engine was modeled after the standard steam engine, had a 3-inch bore, 5-inch stroke and a speed of 100 revolutions per minute. It was without a water jacket, had a continuously sparking ignition plug, located in the middle of the cylinder and laid bare by the piston, thus igniting the mixture in the front and back end alternately and giving off power during the second half of the stroke only. Its fuel consumption was high, and its over-all efficiency from 3 per cent to 4 per cent.

Otto and Langen Free Piston Engine.— Among the most zealous of those who tried to improve the gas engine was a young merchant, N. H. Otto of Cologne. Through experiments in 1861 and 1862 he learned that cooling the gases caused a great decrease in volume, and consequently a partial vacuum. Otto endeavored

to use this for the generation of power. After many tedious experiments he and his partner, E. Langen, to whom we owe the systematic development of this engine, succeeded in perfecting an engine, shown in Figs. 53 and 54. The striking feature of this engine is the use of a free piston connected with the flywheel shaft, *a*, by means of rack, *i*, and pinion, *o*, which runs freely on the shaft while the piston is on its upward stroke, but, by an ingenious clutch arrangement, it grips the shaft on the down stroke. The valve, *e*, by one in- and out-stroke, causes the exhaust, intake and explosion in the order named. It is moved by rod, *d*, connected to crank, *c*. The elastic connection, *d*, is unique and is worth notice. Levers *f* and *g* lift the piston and the charge enters through slide valve, *e*. After the piston has made a stroke



FIGS. 53, 54.— Otto and Langen Free Piston Engine.

of a few inches the valve, *e*, carries the ignition flame to the inlet port causing a sudden combustion of the charge within the cylinder. The power developed drives the piston upward with a maximum velocity of over 2,000 feet per minute. Due to over expansion and cooling of the gases a vacuum is created below the piston, and, on the down stroke of the piston, work is done by the atmosphere and the weight of piston and rack. This free piston engine was exhibited at the Paris Exposition in 1867. Laymen were even afraid of the instantaneous ascent of the rack, and experts criticized severely the awkwardness and noise of the engine. After a competitive test with 14 other gas engines, in which it showed an over-all efficiency of 15 per cent, opinions suddenly changed. It completely crushed Lenoir, and held almost the sole command of the market for 10 years, several thousands being constructed in that period.

Brayton Engine.— This engine is an American product and was introduced to the public by Brayton at the exhibition in Philadelphia in 1878. It is of the single acting, two cycle type with a working stroke at every revolution. Gas and air are compressed by a separate pump and then delivered to the motor cylinder where, on entering, they are gradually ignited by a constantly burning flame. There is not an explosion but a combustion at constant pressure. At a certain point the supply of power is cut off and the hot gases expand to almost atmospheric pressure before discharge. There is a wire gauze fixed behind the flame to prevent the flame from striking back into the charge pipe. If this happens a serious explosion follows, stopping or wrecking the engine. On this account Brayton abandoned the use of gas and substituted light oils. Although the danger of explosion was thus removed, new difficulties arose due to the rapid accumulation of soot in the cylinder which cut the latter. A great number of Brayton engines have been built by the Ready Motor Company of New York. The over-all efficiency of this engine was about 6 per cent.

Otto Engine.— Otto's aim was to use the entire stroke for the explosion and expansion. To obtain this he built an experimental machine in which the engine turned forward for the intake; then the valves were closed and the flywheel turned backward to compress the mixture, which was then ignited by hand. The effect was surprising. The ignited mixture, on account of the compression, exploded with such

violence that the wheel rotated for some time at high speed. This was the more surprising, since, when the engine was operated without compression, it ran at a low speed. So by these experiments, 1861–62, Otto arrived at the compression of the charge before explosion, ignition at the dead-centre and the accomplishment of the charging, compression, combustion and discharging events in one cylinder — in short, he came onto the cycle which is the very foundation of the internal combustion engine development. Great mechanical difficulties, however, prompted Otto to drop his work on this engine and to devote his time to the development of the free piston engine described above. Fifteen years later, in 1877, Otto again took up the work on the four-stroke cycle and succeeded in perfecting the engine so favorably known throughout the world. One of the first new Otto engines is shown in Fig. 55. It is a

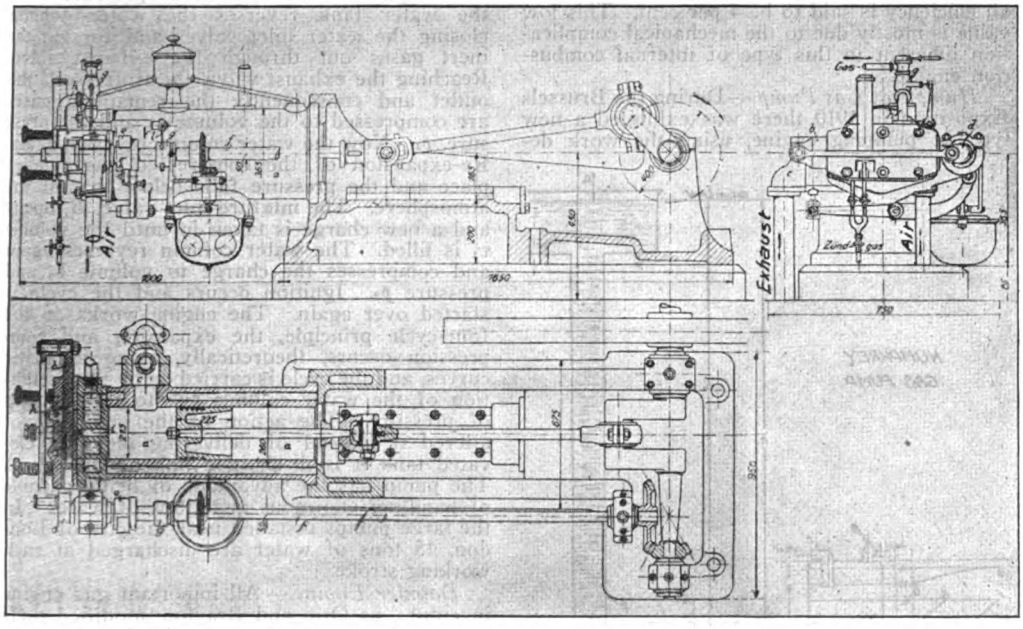


FIG. 55.— Otto Engine, built 1884, 8 B.H.P. at 170 R.P.M.

horizontal, one-cylinder, four-stroke cycle gas engine, consisting of cylinder with water jacket, piston, piston-rod, crosshead, connecting-rod, crankshaft, flywheel, frame and timing gears. The cylinder has a clearance space, *a*, of about two-thirds of the piston displacement. The entrance of the gas and air, as well as the ignition, is controlled by the slide valve, *b*. Exhaust takes place through the valve, *c*, both valves being operated from the half-speed shaft, *f*, by means of the crank, *d*, and the cam, *e*, respectively. The gas valve, *g*, is operated by the cam g^1. At the beginning of the intake stroke the exhaust valve, *c*, is closed, while the slide valve, *b*, has moved its air canal to communicate with the channel, *i*, of the cylinder head. Air alone is drawn in for the first part of the stroke, which is supposed to force the burnt gases of the clearance space against the receding piston. In the meantime the valve, *l*, has moved far enough to open the gas inlet, while the cam, g^1, has opened the gas valve, *g*, so that gas and air enter the cylinder simultaneously at the end of the stroke. Now the slide valve, *b*, closes the port, *i*, and the charge is compressed into the clearance space by the returning piston. During this time the slide valve, *b*, has moved to the right, and the ignition port, *h*, is opposite the port, *i*, so that the flame is carried through, *i*, into the clearance space, *a*. Ignition occurs on dead centre and combustion takes place at almost constant volume. At the end of the expansion stroke the valve, *c*, is opened and exhaust occurs during the next stroke. The burnt gases in the combustion chamber cannot be expelled, but remain and become a part of the next charge. Governing is by the "hit and miss" principle. The carrying out of the four-stroke cycle in the Otto engine is mechanically almost perfect. The over-all efficiency was about 15 per cent in small sized engines, increasing with capacity of cylinder and improvement of construction. To-day Otto engines show over-all efficiencies of 28 per cent to 30 per cent. In 1878 the largest engine sold was 4 horse power; 1880, 20 horse power; 1885, 80 horse power; 1889, 100 horse power; 1893, 200 horse power; 1900, 1,000 horse power; in 1912, 6,000 horse power in the double-acting four cylinder units were delivered. Fig. 56 illustrates a double-acting, four cycle, high-powered gas engine of American make.

Holzwarth Gas Turbine.— The recent great success of the steam turbine has aroused not less interest in the internal combustion turbine again, while from a thermodynamical point of view the problem of the gas turbine is not worse and not better than that of the reciprocating gas engine, however, the mechanical aspects offer less encouragement. The combustion of fuel in the gas turbine may take place at constant volume without or with com-

pression of the charge or at constant pressure. The only gas turbine of considerable size which has yet appeared is the one systematically developed by Hans Holzwarth. It is of the explosion (constant volume), compressed charge type with a nominal output of 1,000 horse power at 3,000 revolutions per minute, gas and air are separately compressed by compressors and forced into a number of combustion chambers arranged annularly around a vertical shaft, on which a horizontal turbine wheel is fixed. Each combustion chamber contains gas and air inlet valves, spark plugs and a nozzle valve. The latter is closed during the charging period. The explosion pressure forces it open, thus enabling the high-tension gases to pass through the small nozzle on the turbine wheel at high velocity. After having given up their energy to the wheel the burned gases escape into the atmosphere. Governing is effected by throttling the gas or by cutting out the spark. The overall efficiency is said to be 4 per cent. This low value is mostly due to the mechanical complication inherent in this type of internal combustion engine.

Humphrey Gas Pump.— During the Brussels Exposition in 1910 there was exhibited a new type of pumping engine, using the work de-

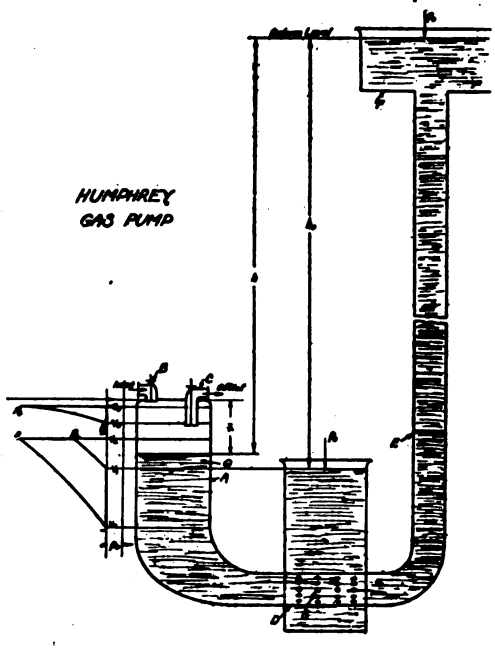


FIG. 56.

veloped by the explosion of a gas-air mixture for the lifting of water. It is known as the Humphrey Gas Pump. Since that time this gas pump has gained a world-wide reputation. It has been introduced into this country and greatly improved by American designers. Its operation can best be understood by reference to Fig. 56. The pump consists of a vertical gas cylinder, *A*, with inlet and outlet valves, *B* and *C*. These valves interlock with each other. On the water side of the pump there is a suction pipe, *D*, a number of suction valves, *S*, and a pressure pipe, *E*, connecting the cylinder with the pressure tank, *F*. The water column, *G*, forms a gas-tight piston. To start the engine the combustion chamber must be filled with an explosible gas-air mixture, having the pressure, p_2. This mixture is ignited and the pressure, due to the combustion, suddenly increases to p_1. While this takes place the volume will scarcely change so that combustion practically occurs at constant volume. The water column, owing to the increased pressure on its surface, is rapidly accelerated and the gases expand to volume v_4 and pressure p_4.

As soon as the gas pressure has become less than that of the atmosphere the exhaust valve on the top of the cylinder and the suction valves on the water inlet tank begin to open automatically. The inflowing water follows the moving water column and fills the gas cylinder up to volume v_1, thus partly replacing the burned gases. The hydrostatic pressure from the water tank reverses the water column closing the water inlet valves and forcing the inert gases out through the exhaust valve. Reaching the exhaust valve, the water seals the outlet and consequently the remaining gases are compressed to the volume v_4 and the pressure. p_4. Now the water column reverses again. Re-expansion of the compressed gases takes place and the pressure falls below that of the atmosphere. The mixture inlet valve, *B*, opens and a new charge is taken in until the volume v_1 is filled. The water column reverses again and compresses the charge to volume v_2 and pressure p_2. Ignition occurs and the cycle is started over again. The engine works on the four-cycle principle, the expansion and compression occurs, theoretically, along adiabatic curves, and the cycle is carried on by the oscillation of the water column due to the changes of pressure. The action of the pump is not altered if instead of delivering into the elevated tank it is discharged into an air vessel. The pump has the advantage of being capable of handling enormous quantities of water. In the large pumps installed near the city of London, 15 tons of water are discharged at each working stroke.

Daimler Engine.— All important gas engine inventors, as Otto and Brayton, modified their engines in order to use liquid fuel. It remained, however, for Daimler, the pioneer automobile engineer and former manager of the Otto Gas Engine Works, to develop the first gasoline engine of the Otto type for automotive work. The main characteristic of the Daimler engine was its high speed. Contemporary gas engines were running at 150 revolutions per minute, while Daimler increased the speed to 800 revolutions per minute. This meant a considerable reduction in weight at equal power output, yet, on the other hand, a higher strain was set up in the various parts of the engine, necessitating better materials of construction. Thus the Daimler engine incidentally gave also the impetus for the development of high-grade materials without which the present day automotive engines would be impossible. Daimler's first engine, built in 1884, was of the horizontal one-cylinder type, and differed from the original Otto engine only in speed, weight, fuel and valve gear mechanism. Later he constructed vertical engines of the twin cylinder V-form,

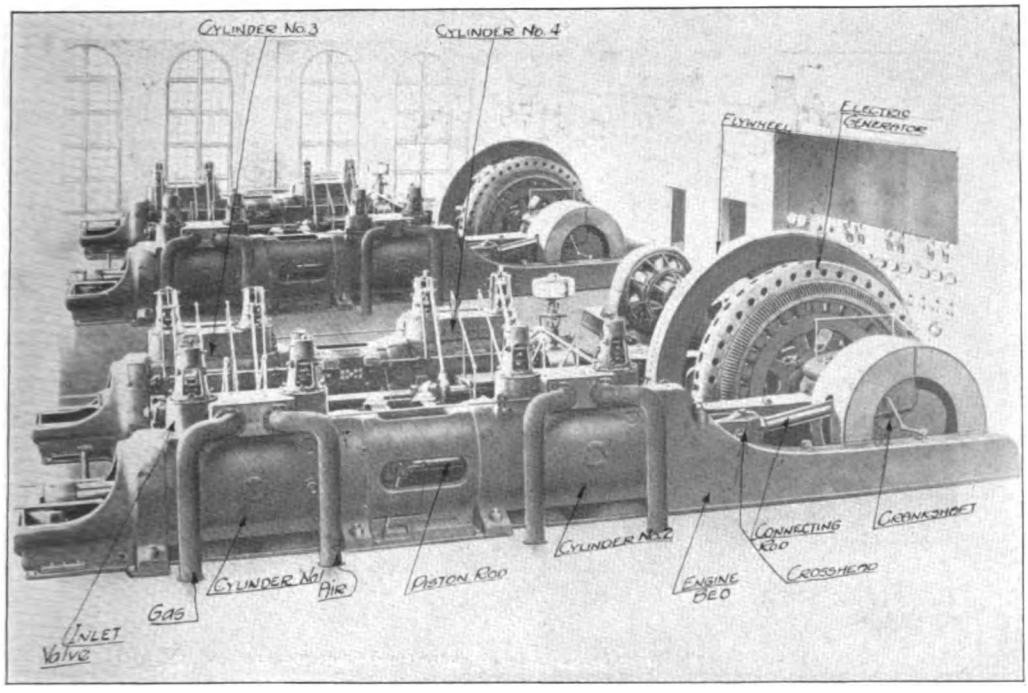


Fig. 56 Two Double-Acting, Twin Tandem, Gas Engines

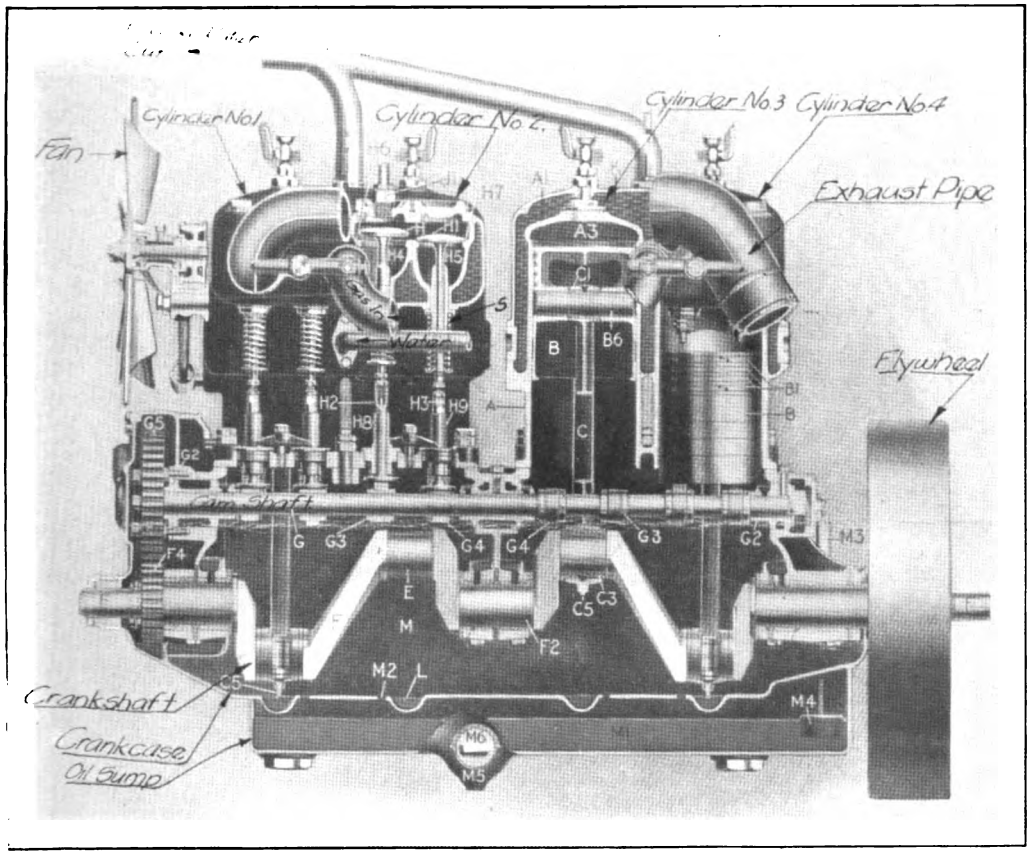


Fig. 58 Part Sectional View of a Four Stroke Cycle Automobile Engine

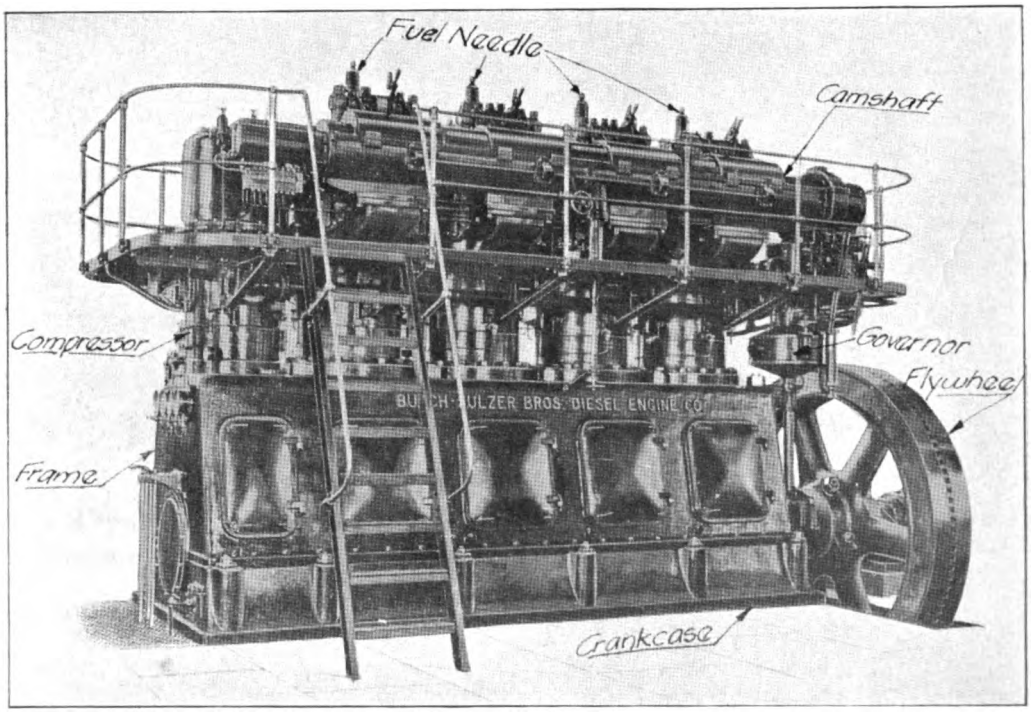


Fig. 63 520 Brake Horse Power—Diesel

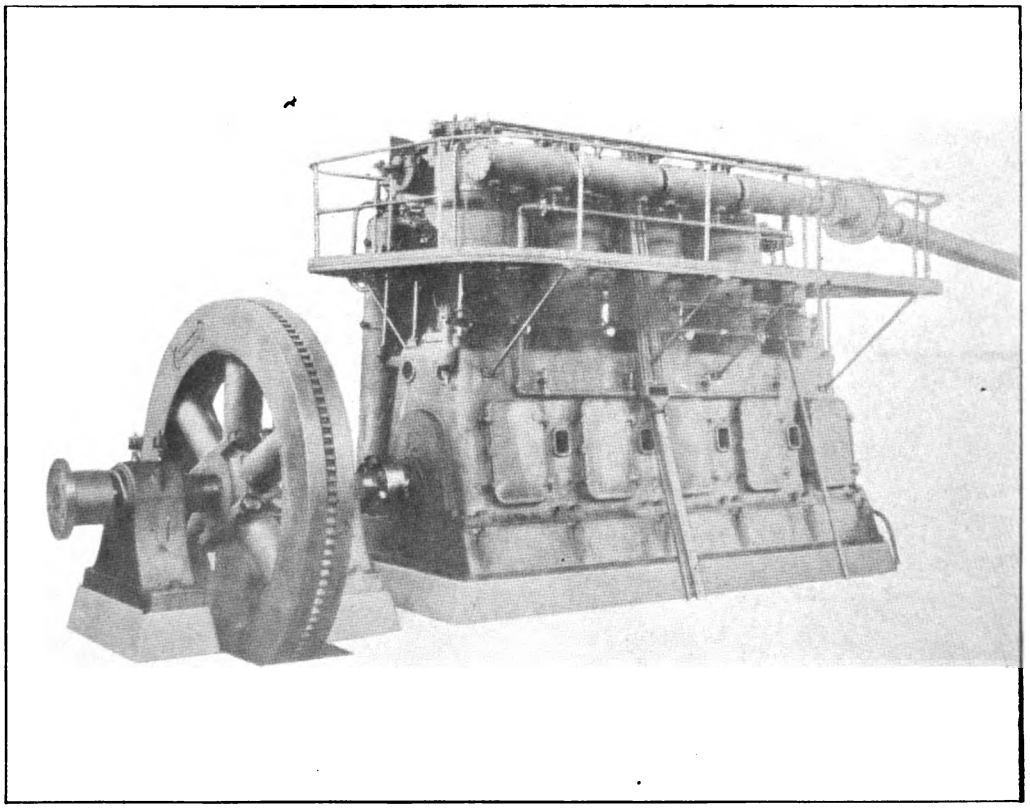


Fig. 64 Type B stationary engines have a single box frame for the entire set, as shown in the illustration, with a multiple-stage air compressor for the fuel injection driven directly from a crank on the end of the main shaft

and the four cylinder all in line type. The latter has gradually been developed to the standard automobile engine of to-day (see Fig. 58), running at a speed of 600 revolutions per minute to 3,000 revolutions per minute. Starting at the left and upper part, cylinder No. 1 is the outside view. Cylinder No. 2 is cut away at the front, showing the poppet valves, H and H_1, controlling inlet and outlet of gases, respectively; the valve chamber, H_4 and H_5; the valve seats, H_6 and H_7; the spark plug J_1; valve springs, S; the push rods, H_2 and H_3; the push rod guides, H_8 and H_9; and the cams, G_3 and G_4. Cylinder No. 3 is cut through its centre, thus showing the piston, B; the wrist-pin, B_6; the connecting rod, C; the cylinder, A; the waterjacket, K; the combustion chamber, A_3 and the cylinder head A_1. The crankshaft, F, is a high grade steel forging and has three main journals, F_2, and four crankpins, E. The valve timing or half-speed cam shaft, G, driven through gear, G_5, by pinion, F_4, on crankshaft, F, has three main bearings, G_2. The four inlet cams G_3, and the four outlet cams, G_4, are fixed to this shaft. At the lower end of each of the connecting rods, C, is a splasher or oil dipper, C_2. The crankcase, M, encloses the base of the engine. Splash troughs, L, are in the bottom of the crankcase beneath each connecting rod, C. The oil reservoir, or sump, M_1, is located beneath the crankcase. The parts requiring lubrication are the crankshaft bearings, crank-pin bearings, piston pin bearings, cam-shaft bearings, timing gears, cams, valve-lifter guides, pistons, piston rings and cylinder walls.

In almost all gasoline engines the intake of fresh gas to the cylinder and the exhaust of the

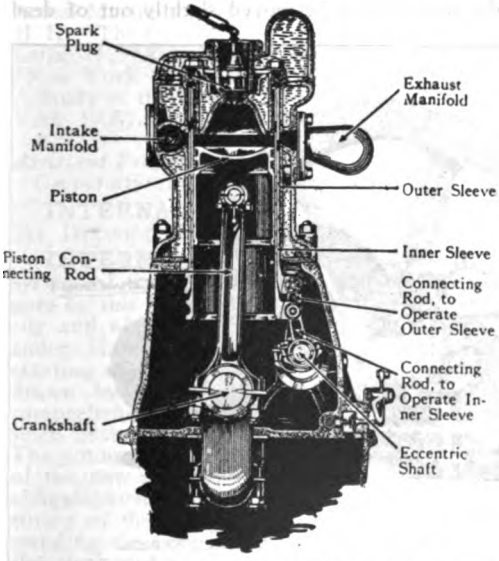
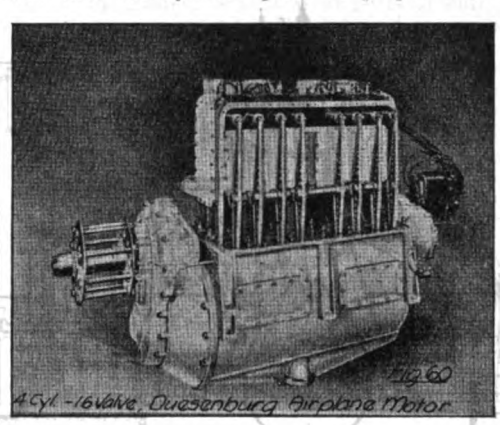


FIG. 59.— Sectional View of Cylinder in Willys-Knight Motor.

inert gases from the combustion chamber are governed by clashing "poppet" valves. These valves are rather noisy. To eliminate this noise in automobile engines, Charles Y. Knight invented "sleeve valves" also known as the Knight valves, which, besides offering other advantages, have proved to be noiseless. Two cylindrical sliding valves glide silently up and down between the cylinder wall and the piston, one working within the other. Ports or openings in these sleeves register with each other and with the cylinder ports at proper inter-



vals, forming large and unobstructed passages for intake and exhaust gases. The operation of the sleeve valves is clearly explained in the accompanying illustration, Fig. 59. Fig. 60 shows a four cylinder four-cycle gasoline engine as adapted to airplane requirements. The weight of the engine has been reduced to three and one-half pounds per horse power. At a normal speed of 2,100 revolutions per minute the engine develops 125 horse power with a bore of four and three-quarter inches and a stroke of seven inches. By means of a gear reduction, the speed of the propeller shaft is reduced to 1,210 revolutions per minute.

Diesel Engine.— Dr. Rudolph Diesel of Munich, Bavaria, published in 1893 a book: "The Theory and Design of a Rational Heat Engine," in which he described the principles of an ideal internal combustion engine, for the efficient operation of which he formulated the three main requirements. (1) Creation of the highest temperature in the cycle by mere compression of pure air and not by combustion of the charge. (2) Gradual introduction of atomized fuel into the highly compressed and consequently highly heated air in such a way that the temperature of the charge remains constant. (3) Proper selection of the air-gas ratio to allow a practical operation of the engine without using a waterjacket.

The compression pressure of this ideal engine was 250 atmospheres and the thermal efficiency 73 per cent. Dr. Diesel expected considerable trouble due to the high pressures, consequently he proposed another "approximatively ideal" cycle with lower compression pressure and efficiency. Patents granted to Diesel enabled him to form a partnership with the Maschinen Fabrik Augsburg and Friedrich Krupp of Essen. After several years of very difficult and tedious experimental work, Diesel found out that his ideal engine could not be realized. The oil engine, however, which was developed by him and his associates between 1893 and 1898 showed an over-all efficiency of 32 per cent, and thus turned out to be by far the most efficient heat engine yet built.

In Figs. 61 and 62 an early type of Diesel engine working on the four-stroke principle is illustrated. The main parts of the engine can be clearly recognized in the transverse section Fig. 61. They are the crankcase, the frame

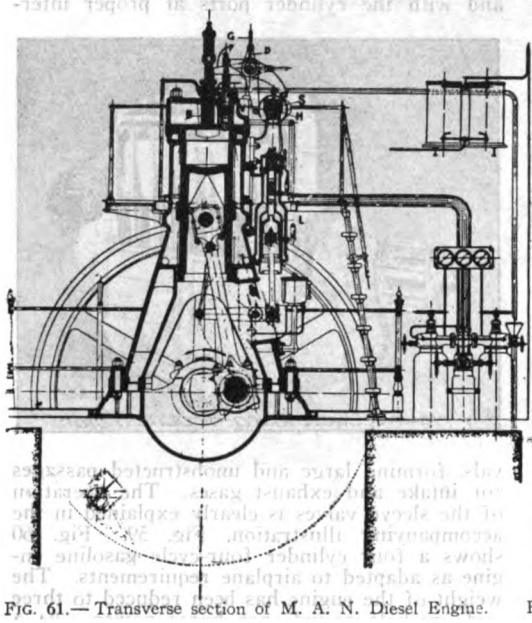


FIG. 61.— Transverse section of M. A. N. Diesel Engine.

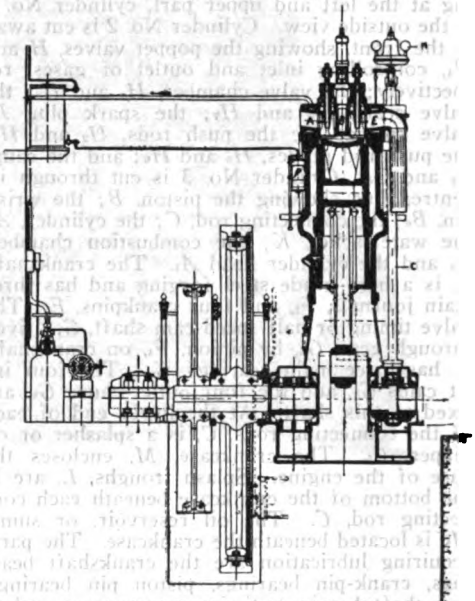


FIG. 62.— Longitudinal Section of M. A. N. Diesel Engine.

with waterjacket; cylinder liner and cylinder cover, the piston with the wristpin, connecting rod and crankpin, the two-stage air compressor, *L*, driven by the connecting rod by means of a walking beam, the camshaft, *H*, with the cams, bearings, the vertical shaft, *c*, driving the horizontal camshaft, *H*, and the governor, *M*, the air inlet valve, *E*, and the exhaust valve, *A*. The air furnished by the air compressor at a pressure of about 1,000 pounds per square inch must be cooled before it is stored in the air flasks. By means of pipes the compressed air is carried from the flasks to the starting valve, *F*, and the fuel needle, *B*. To start the engine the piston must be moved slightly out of dead

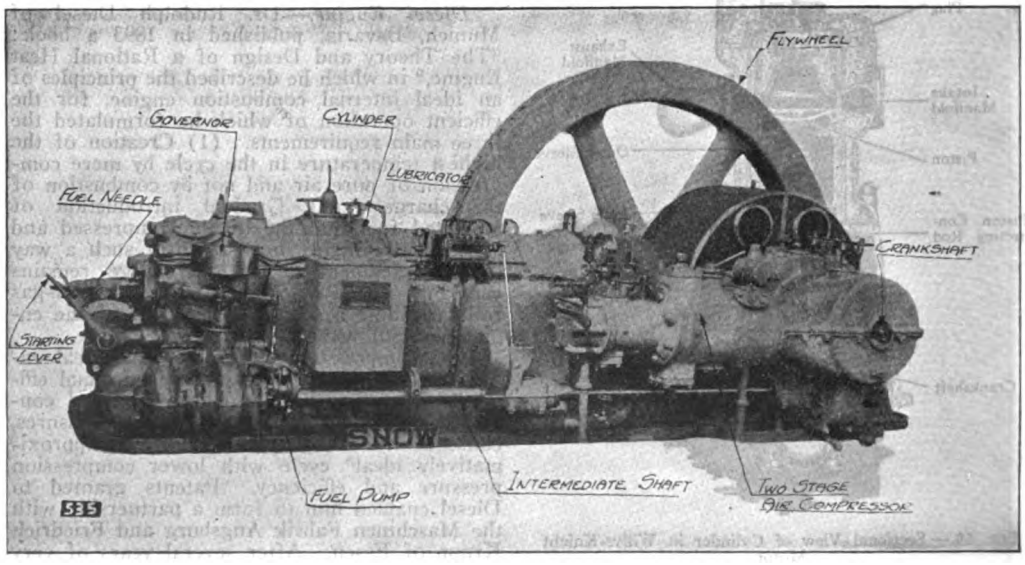


FIG. 65.— 170 H.P. Two-Cycle Diesel Engine, One Cylinder, Horizontal Type.

S, and the fuel pump (not shown), the starting valve, *F*, and the fuel needle, *B*, operated by the levers *D* and *V*, respectively. In the longitudinal section Fig. 62 there are shown the crankshaft with flywheel and pulley, the three centre and the hand lever, *G*, laid down in the horizontal position. This throws the needle valve out of action and brings the lever arm *D* in contact with the starting cam, thus putting the starting valve in operation and allow-

ing compressed air to enter the cylinder. The piston begins to move down and the speed of the engine increases. After the latter has made several revolutions the hand-lever *G* is turned back into the vertical, the operating position, in which the fuel needle is in regular operation and the starting valve at rest.

In this country the Busch-Sulzer Bros.-Diesel Engine Company is the original and was, from 1898 to 1911, the only company manufacturing Diesel engines in America. It owns all United States patents granted to Dr. Rudolph Diesel, and is closely associated with the old firm of Sulzer Brothers of Winterthur, Switzerland, with which it is in intimate co-operation. After the original United States Diesel patents had expired in 1912, many other engine concerns took up the manufacture of the Diesel engine. Figs. 63 to 65 illustrate some recently designed Diesel engines of American make.

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INTERNAL REVENUE DISTRICT. See DISTRICT.

INTERNAL REVENUE SYSTEM. The system of taxation in the United States, which goes by this name, was the outgrowth of necessity and of the administrative genius of Alexander Hamilton. The law of 2 Sept. 1789, creating the Treasury Department, had been drawn by him, and with such precision and comprehensiveness that but few changes have since been made in its substance or language. The young Secretary considered it to be the duty of the new national government to assume the obligations incurred by the States in the prosecution of the War of Independence. Notwithstanding the void in the Federal Treasury and the straitened finances of the country at large, he had prevailed on Congress, after a bitter struggle, to become responsible for the payment of about $24,500,000 of debt, which the States were unable to meet and had practically repudiated. The new government itself was little better off. The revenues from customs were inadequate; the nation was poor and imports were small. Hamilton's suggestion was to place an excise on domestic distilled spirits. Though there was as yet no formal differentiation of political parties, the antagonism between the broad and strict constructionists of the Constitution was already manifesting itself. The design of the Secretary to exercise, within the States, as well as at ports of entry, the taxing powers which he believed to reside in the Federal government, met with strong resistence from the Anti-Federalists, who regarded the project as unwarrantably intrusive into the domestic affairs of the States. Moreover, the opposition obtained the support of powerful business interests and of a considerable body of public opinion. There were about 100 distilleries in Massachusetts alone, most of them in Boston, where West Indian molasses (exchanged by Yankee traders for their exports of fish and lumber) was converted into New England rum. In the West and South whisky was made from grain at hundreds of stills in commercial quantities. Rum and whisky were articles of general consumption. The first bill, introduced in Congress in 1790, was defeated; but before the end of the session, by the act of 3 March 1791, Hamilton had secured a measure imposing a tax on distilled spirits, graduated from 11 to 30 cents per gallon, according to alcoholic content and the origin of the raw material, domestic or foreign. Although the impost weighed more heavily on rum, made from imported molasses, than on whisky made from home-grown corn, the demonstrations against it became particularly violent in the Alleghany and Cumberland mountain regions. In September 1791 a revenue officer was tarred and feathered in western Pennsylvania, as a defiance of the government. The incipiency, progress and suppression of the Whisky Rebellion (q.v.) it is not proposed here to discuss. Suffice it to say that, when it collapsed in September 1794, it left the right of the Federal government to levy excise on domestic products and within the States firmly established. The right to tax whisky was never thereafter questioned, except by the "moonshiners" of the Appalachian highlands, whose conflict with the "revenuers" has continued to this day.

Having obtained recognition for the principle, Secretary Hamilton proceeded to give it wider application. An excise laid in 1794 on carriages used for pleasure or ostentation was assailed as unconstitutional; but the Supreme Court (Hylton *v.* U. S., 3 Dallas, 171) sustained the act. The objection that the tax, being direct, should have been apportioned among the States according to population, evoked from the court the remark, that the only taxes it could conceive to be direct were head taxes and land taxes. In 1794 also laws were passed imposing excise taxes for selling at retail foreign wines and liquors; an excise of 8 cents a pound was laid on snuff; an internal revenue duty of 2 cents a pound was laid on sugar refined in this country, also a tax on sales by auction. By the law of 6 July 1797, "stamped vellum, parchment or paper" was required to be used for a great variety of legal documents and negotiable instruments. In these several laws the internal revenue system, as it ultimately took form, was broadly outlined. All of these enactments were repealed, however, on 6 April 1802, little more than a month after

the inauguration of Jefferson as President and the ouster of the Federalists. The revenue derived from internal taxes in the few years they were actually collected amounted to $6,325,000, besides which about $700,000. though assessed remained unpaid at the time of the repeal. The financial necessities of the government, occasioned by the War of 1812, compelled recourse once more to forms of taxation other than customs dues. Nearly all the excises of Hamilton's internal revenue system were reimposed in 1813 and, for the first time, home industries other than the distilleries and snuff factories were taxed. There was a new tax on carriages, now including the harness; on boots and leather, beer, candles, caps and hats, parasols and umbrellas, paper, playing cards and saddles and bridles; also on watches, jewelry, gold, silver and plated ware. Stamped paper was required for bonds, bills, notes and other commercial instruments. Here are all the incidences of taxation, which have become characteristic of the internal revenue system; but its mainstays, then as later, were the whisky and tobacco taxes. After the war they were all repealed and, thenceforward, until 1861, the ordinary revenues of the Federal government were derived exclusively from the customs.

The act of 5 Aug. 1861 was primarily intended to (temporarily) increase duties on imports; though it also imposed a direct tax of $20,000,000, to be assessed on land and collected for the government by the States. The law of 1 July 1862, however, which is entitled: "An act to provide internal revenue for the support of the government and to pay interest on the public debt," was a conscious effort to establish a new system of Federal taxation. It created the office of Commissioner of Internal Revenue in the Treasury Department and provided for an organization of collectors and inspectors, which has been maintained substantially as first organized up to the present time. The tax on whisky was fixed by the Internal Revenue Law, as the act was called, at only 20 cents per proof gallon, probably following the precedent of the law of 1813; but this tax was increased by three successive enactments in 1864, first to 60 cents, then to $1.50 and, finally, to $2 per gallon, where it remained until 1868. The newly developed oil industry received marked attention, for quite as heavy a tax was placed on illuminating and lubricating mineral oils (20 cents per gallon) as was originally placed on whisky; moreover, refiners of oil were subjected to all the provisions applicable to distillers of spirits with respect to special (license) taxes, bonds, returns, assessments and removals to and withdrawals from warehouses. All other illuminants then in common use, such as gas and candles, were likewise taxed, but this accorded with the general policy of the act to obtain revenue from everything in sight. It taxed bar, hoop and sheet iron, steel, wire, wood screws and cut nails; locomotives and marine engines and boilers; brass tubing and lead pipe, textile fabrics, clothing and trimmings, felt hats, silk hats and bonnets, hides, leather and factory-made shoes, hoopskirts, diamonds, jewelry, watches and gooseberry wine; also sugar, ground spices, chocolate and dry mustard. The products of domestic agriculture, cotton excepted, went free and farmers were unlicensed; but special, or license, taxes were placed on practically all other occupations. The butcher, the baker and candlestick maker (this is a literal truth) had to pay, and so did the doctor and lawyer. The stamp taxes were expected to yield $20,000,000 a year, but they produced twice that amount. All legal documents, all kinds of commercial instruments, including checks and receipts, bonds, insurance policies, conveyances and mortgages had to be stamped; and, if unstamped, the law declared them void and forbade them being placed on record or used as evidence. The law also imposed dues on successions and legacies, and a tax of from 3 to 5 per cent, graduated to their amount, on incomes. Most of these were, and so intended to be, war taxes. Reductions began to be made in 1866 by the first Congress that met after the restoration of peace. Many of them were abolished in 1867 and 1868 and practically all of them, including the tax on incomes (but excluding the stamp taxes and the excises on whisky, tobacco and beer) were lifted by the law of 14 July 1870.

The Internal Revenue Act and its successful enforcement had demonstrated the wide scope of the taxing powers of the Federal government. Its right to levy tax on incomes was not successfully assailed until 1914, when the Supreme Court declared the Income Tax Law passed that year to be unconstitutional. Most of the stamp dues were abolished in 1872, the longest to continue being those on checks, toilet articles, patent medicines and playing cards. The taxes on whisky, beer, manufactured tobacco and cigars became the enduring features of the Federal system of internal taxation; and they were the most productive. The largest amount collected under the Internal Revenue Law of 1862 in any year was in 1866, before any of the war taxes had been abolished, when $310,000,000 was turned into the Treasury from this source. The total collections in the 30 years following 1864, when the original act of 1862 obtained its final form, amounted to approximately $4,550,000,000, of which two-thirds was derived from whisky, beer and tobacco. By the act of 13 July 1866, stamps were first required to be affixed to beer kegs as evidence of payment of the tax on the contents. The result was so satisfactory, in this particular, that two years later tax-paid stamps were required to be affixed to the original packages of distilled spirits when taken out of bond, and to each box or other container of cigars and manufactured tobacco before the goods left the factory where they were made. As a substitute for, or as an additional check on, the elaborate systems of accounting employed to prevent frauds on the revenue, the tax-paid stamp has abundantly proved its usefulness. Its efficiency came into question in 1875, when the "Whisky Ring" trials disclosed a jugglery with distillers' and rectifiers' stamps (which are not tax-paid but merely certify the contents of the packages) whereby the government had been defrauded of many millions. The success of the frauds was due, however, to the corruption of revenue officers as well as to defects in the stamp laws. Since the introduction of new checks, suggested by the experience with the "Whisky Ring," there have been no serious losses in the collections. This is remarkable in view of the fact that the tax on distilled spirits,

which was finally set at $1.10 per gallon, where it remained fixed for 40 years, amounted to about four times the first cost of the product. The internal revenue system became one of the most productive taxing systems of the world. The collections steadily increased and in ratio to the growth of the nation in population and wealth; and for the fiscal year ended 30 June 1914, the last under normal conditions, they amounted to $305,491,548. This was exclusive of the new income tax, for the laying of which authority had to be obtained by amendment of the Constitution. The collections from customs in the year mentioned amounted to $292,320,015 — about $13,000,000 less than the internal revenue taxes. The administration of the Internal Revenue Law is complicated and requires the employment of a large field force of inspectors, gaugers, etc., besides the office forces at Washington and in the numerous collection districts. Nevertheless, the cost of administration ordinarily does not exceed 2¼ per cent of the amount collected, which is about two-thirds of the cost of collecting the customs. The internal revenue system on all occasions has proved its adaptability to national emergencies. During the Spanish War the collections from this source were readily increased from the normal of $170,900,641, in 1898, to $273,437,161, in 1899, to $295,327,926, in 1900, and $307,180,683, in 1901. In the American fiscal system the internal revenues took the place occupied by the income tax in the calculations of British budget makers. Though the increase of internal revenue taxes is not as simple as the addition of a penny to the pound to the income tax rate, our system has been fairly elastic. It obtained its flexibility by the raising and lowering of the taxes on beer and tobacco, as occasion required, and the imposition and remission of stamp duties. The income tax has now become a permanent source of revenue for the Federal government, and this tax alone has the elasticity necessary to meet a situation in which calls for hundreds of millons are superseded by calls for billions. Notwithstanding one may discern in the newly imposed taxes on war industries, excess profits, pleasure vehicles, amusements, jewelry and dispensable luxuries, and in the stamp dues, the old concepts of the originator of the system, though enlarged to a colossal scale.

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INTERNATIONAL ARBITRATION. See ARBITRATION, INTERNATIONAL.

INTERNATIONAL BOUNDARY TRIBUNAL. See ALASKAN BOUNDARY COMMISSION.

INTERNATIONAL BROTHERHOOD OF MAINTENANCE-OF-WAY EMPLOYEES, an American labor union, having a department of fraternal insurance. It was founded at Demopolis, Ala., in 1887 and in July 1914 had an American membership of 7,291 and a Canadian membership of 7,415; total 14,706. Since its organization it has disbursed more than $500,000 in death and disability benefits. It has secured increased wages for maintenance-of-way employees to the amount of $6,000,000 annually. It was actively engaged in the great strike on the Canadian Pacific Railway in 1901. The strike was settled after a struggle lasting 11 weeks, with the understanding that all members of the brotherhool would be reinstated in their former positions within two weeks; the question of wages to be left to arbitration. Sir John A. Boyd, chief justice of Ontario, was chosen chairman of the board of arbitration and awarded the employees an increase of 20 per cent over previous wages. The brotherhood holds a charter of affiliation with the American Federation of Labor and publishes the *Advance Advocate*, a magazine devoted to the interests of maintenance-of-way employees.

INTERNATIONAL CLAIMS AND DISPUTES. The organization of the world into national states, their close interdependence and the conflicting interests arising during a war, have often led to disputes or the commission of some act or injury by a foreign government, or its citizens, against the United States. In some cases trouble has arisen between a citizen of the United States and one of a foreign country. This may take on an international character when officially recognized and prosecuted by our government. In either case claims arise which often involve a money payment. Settlement is made either through diplomatic agencies, treaties, conventions or by referring the matter to a court of arbitration.

The first important claims made by the United States against a foreign power were provided for in the treaty concluded by John Jay with Great Britain, 19 Nov. 1794. Provision was made for three arbitrations involving, first, questions relating to boundaries; second, the claims of Great Britain on account of confiscated debts; and third, the subject of neutral rights and duties. Commissions were appointed, the first giving its decision 25 Oct. 1798, declaring the river Schoodiac, under the name Saint Croix, to be the one intended as the boundary between the United States and Canada. The second commission met at Philadelphia, but came to no decision regarding the claims of British subjects as to their confiscated debts. This matter was settled later by treaty concluded 8 Jan. 1802, with an award of £600,000 to Great Britain in satisfaction of its citizens' demands. The third tribunal sat at London and decided the case of each American claimant on account of captures made under the Orders in Council, and the British claims against the United States on account of the latter's failure to enforce its neutrality. American claimants recovered $11,650,000, while the aggregate of the awards against the United States appears to have been $143,428.14. Similarly the Treaty of Ghent, 24 Dec. 1814, provided for three arbitrations between the United States and Great Britain relating to the ownership of certain islands and to boundaries.

The most famous of the claims of the United States against Great Britain was the so-called *Alabama* claims. This case was brought before the Geneva tribunal (1872). The claims were based on accusations respecting the failure of Great Britain to enforce strict neutrality during the Civil War by allowing the Confederate government to have vessels constructed in British ports; by failing to prevent their departure and seizure; and by allowing them to be fitted out as privateers, with

equipment and supplies obtained in British ports and conveyed to them in other vessels. As a result many American vessels were captured or destroyed. Great Britain at first denied that she had been guilty of any neglect. In January 1866, Secretary Seward proposed that the *Alabama* claims be submitted to arbitration, and in 1869 a convention provided for a general arbitration of the claims of the United States against Great Britain. This proposal was rejected by the Senate. Finally Secretary Fish arranged, in 1870, for the appointment of a joint high commission to settle all differences between the United States and Great Britain. Each government appointed five high commissioners, who met at Washington, 27 Feb. 1871, and after discussion signed the Treaty of Washington 8 May 1871, providing for arbitration of the *Alabama* and other claims. Great Britain apologized for the escape of the *Alabama* and other Confederate cruisers from British ports. She admitted that a neutral government was bound to use "due diligence in the performance of its duties." The claims for damages were to be submitted to five arbitrators. The United States was represented by Charles Francis Adams. The other arbitrators were appointed by the queen of England, the king of Italy, the president of the Swiss Confederation and the emperor of Brazil. The arbitrators met at Geneva and found that there had been negligence on the part of Great Britain, especially in respect to three Confederate cruisers, the *Alabama*, the *Florida* and the *Shenandoah* and awarded the United States $15,500,000.

Another dispute with Great Britain was over questions affecting the free use of the seas, involving the fur seal arbitration. The United States claimed jurisdiction over the Bering Sea, with power to protect seals outside the three-mile limit. Great Britain disputed both claims. Negotiations for arbitration led to the Convention of 29 Feb. 1892, which referred the controversy to a tribunal of seven arbitrators. This tribunal met in 1893 and decided that the United States had no property rights in fur seals outside the three-mile limit, and prescribed regulations for the protection of seals for five years, by joint action.

Other disputes with Great Britain were those of the Northeastern Boundary, settled by the Webster-Ashburton Treaty in 1842; the Alaskan Boundary, settled by a commission 20 Oct. 1903, largely in favor of the United States, and the North Atlantic Coast Fisheries, settled by The Hague Court, 7 Sept. 1910.

The United States has had several disputes with France involving principally the question of claims arising from the destruction or capture of American ships during the Napoleonic Wars. On 22 April 1793, Washington issued his proclamation of neutrality, but it was constantly violated by the fitting out of privateers, the condemnation of prizes by French consuls sitting as courts of admiralty and by the capture of vessels within the jurisdiction of the United States. The matter was complicated by the varying interpretations given to the treaty with France made in 1778, by Genet, the French Minister, and by the American government. Besides the claims arising from the destruction of vessels within the jurisdiction of the United States some of our ships were captured or destroyed on the high seas by French privateers. James Monroe was appointed Minister to France by Washington in 1794 with instructions to demand compensation for captures and spoliation of property of Americans by French cruisers. Monroe was recalled and in 1796 Charles Cotesworth Pinckney was appointed Minister with instructions to press the claims for spoliation, but the Directory then in power refused to recognize a Minister from the United States. Meantime captures, confiscations and condemnation of vessels and cargoes occurred. A special mission was appointed by President Adams in 1797 consisting of Charles Cotesworth Pinckney, John Marshall and Elbridge Gerry, who were instructed to secure a settlement of the spoliation claims, but they were unsuccessful.

Finally the mission composed of Elsworth, Davie and Murray, appointed 25 Feb. 1799, was instructed to secure compensation for all captures and condemnations of vessels contrary to the law of nations. Napoleon appointed plenipotentiaries to negotiate and a convention was signed 30 Sept. 1800, providing for a future settlement and this was finally ratified by the Senate and the French government. In connection with the treaty of 30 April 1803, ceding Louisiana to the United States, two conventions were signed, one of which provided for the settlement of the spoliation claims. Commissioners were appointed, 18 May 1803, who sat at Paris, examined the claims and made awards. This was known as the French Indemnity of 1803. The amount finally paid by France was $3,750,000.

The various decrees issued by Napoleon in retaliation for England's Orders in Council, especially those of Berlin, Milan and Rambouillet, resulted in the capture or confiscation of a large number of ships and their cargoes. The loss to Americans in consequence of the Rambouillet decree has been estimated to have been no less than $10,000,000. Between 1816 and 1829 several attempts were made by American Ministers to France to settle these spoliation claims. Finally the American Minister, Mr. William C. Rives, succeeded in persuading France to agree to the payment of 25,000,000 francs in six instalments, with interest on each from the date of the convention. Ratifications were exchanged at Washington, 2 Feb. 1832, and three commissioners were appointed by Act of Congress, 13 July 1832, to receive and examine claims. The labors of the commission proved to be very onerous and the whole period of its duration was about three years and five months. It reported, 7 June 1834, a list of claims presented, 3,148, of which 1,567 were allowed and 1,581 disallowed. Considerable difficulty and delays arose in connection with the payment of the six annual instalments by France, which led to threats by Jackson and recommendation of reprisals and finally to the breaking of diplomatic relations between the two countries. Friendly relations were restored, however, and the amount finally received from France with interest was $5,558,-108.07.

The United States has had several disputes with the South and Central American republics, most of them growing out of filibustering ex-

peditions fitted out in the United States to aid in revolutions, Isthmian canal projects, boundary disputes and destruction of property of American citizens. An example of the first class was the effort of the Central American republics to checkmate the filibustering expeditions of William Walker, 1855–58, and their endeavors to induce the United States to take notice of his violation of neutrality laws. A second example was the dispute with Colombia over Canal Zone. A convention was negotiated 22 Jan. 1903, with Colombia, giving the United States the right to construct a canal across Panama, then a state in the Colombian Federation, together with the "use and control" of a zone of territory along the routes. For this privilege the United States was to pay $10,000,000 down and $250,000 each year, from 1913 on. Colombia failed to ratify the treaty. But four days after the Colombian Congress adjourned, a revolution occurred in Panama. American troops were landed and Colombian troops were prevented from landing. A few days later, 6 November, the United States recognized the Republic of Panama. On 18 Nov. 1903, a similar treaty was negotiated with Panama, recognizing the United States "as the sovereign over the territory" in question, a strip across the Isthmus 10 miles wide. By a treaty made January 1909, between Colombia and Panama and Panama and the United States, the latter granted Colombia $250,000 a year which had originally been agreed upon in return for the rights granted in connection with the Panama Canal.

The United States has also been drawn into disputes with foreign countries involving South and Central American republics, because of the Monroe Doctrine; for example, the dispute between Great Britain and Venezuela respecting the boundary of British Guiana. President Cleveland in 1895 insisted that under the Monroe Doctrine it was the duty of the United States to see that Great Britain did not take any Venezuelan territory that she was not entitled to. Venezuela appealed to the United States and the latter offered its services as arbitrator. Great Britain at first refused either to recognize the right of the United States to be heard or to submit the question to arbitration, but under pressure agreed to arbitrate, and in February 1897, an agreement was reached which granted to Great Britain most of the territory in dispute.

Claims of American citizens or corporations have frequently been made against South American republics, because of confiscation or destruction of property, especially in time of civil war.

A dispute with Italy arose, 15 March 1891, out of the shooting by a mob of several Italians in jail at New Orleans. They were awaiting trial for the murder of Mayor Hennessey, who had been investigating the operation of the Mafiosi, a famous secret society. The Italian government demanded punishment and indemnity, though jurisdiction was with the State of Louisiana and recalled her Ambassador. Finally in 1892 the United States voluntarily paid an indemnity of $24,000 to Italy and friendly relations were restored.

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INTERNATIONAL COPYRIGHT. See COPYRIGHT.

INTERNATIONAL CORRESPONDENCE SCHOOLS. See SUPPLEMENTAL EDUCATION.

INTERNATIONAL COUNCILS OF WOMEN. See NATIONAL AND INTERNATIONAL COUNCILS OF WOMEN.

INTERNATIONAL DATE LINE. The imaginary line at which dates change, being made later by one day by those who cross the line from east to west and earlier by one day by those crossing it from west to east. It is a somewhat irregular line drawn through the Pacific Ocean in a general northerly and southerly direction and separating the islands of the Pacific Ocean in such a manner that all those lying to the east of it carry the same date as the United States, while all those on the west of it carry the same date as Japan and Australia. If a person start at midday, that is, when the sun was shining perpendicularly on the meridian that passes through the place of starting, and travel westward, keeping pace with the sun, thus keeping the sun directly over the meridian of the place at which he might be, he would make a complete journey around the globe in twenty-four hours and return to his place of starting at noon the next day. Twenty-four hours would have passed, but to the traveler the sun would have been shining perpendicularly as at noon all the time; and the question arises, when or at what point did the traveler change from noon of one day to noon of the next? For instance, if he should start at Monday noon and keep the sun in the zenith, he would arrive at the place of starting Tuesday noon — it would be noon-day to him during the whole journey of 24 hours. Monday noon would change to Tuesday noon without an intervening night; where would the change occur? It is to him apparently still Monday noon and to obtain the correct date he must drop a day. The reason for dropping a day can be more fully shown as follows: Remembering that the earth makes one complete revolution on its axis in 24 hours and thus the sun in its apparent diurnal revolution moves over 360 degrees of space in 24 hours, it thus moves over 15 degrees of space in one hour, from which it is evident that the difference in longitude which causes the difference in the relative time, may be estimated in time, allow-

ing 15 degrees to an hour, or one degree to four minutes. Therefore, suppose a man starting from any given point travel one degree west, his watch, instead of marking 12 o'clock at noon, according to the correct time at that place, would mark four minutes after 12. Let him travel west 15 degrees, and he will find that one o'clock by his watch will be noonday by the sun. Let him go on to 120 degrees and when the sun is in the zenith his watch will indicate eight o'clock P.M. Completing his journey around the globe, he will have gained, in this manner, 24 hours. From this it will be seen that in order to obtain the correct date 24 hours must be subtracted from his time. On the other hand if a person could travel eastward at the same speed with which the sun apparently travels westward (the same rate of speed with which the earth revolves on its axis), if he should start on his journey at noonday, he would meet the sun when exactly on the opposite side of the earth from the place of starting and continuing the journey would again meet the sun at the place of starting, thus seeing three noondays within the 24 hours, or apparently gaining a day. This we know to be impossible, since only 24 hours of time have passed, while in reality an extra period of light has been gained and thus to obtain the correct local date a day must be added to your time. From this we see that, for every time a person travels around the earth in either direction there is a difference in time of one day and the result is the same regardless of the rate of speed. To avoid the confusion of dates which must necessarily result from this constant gain on one side and loss on the other, it has been proposed to determine upon some line at which eastern bound travelers shall add one day and westward bound travelers shall drop a day from their reckoning and thus prevent a disagreement in regard to the day of the week. The line at which this addition or subtraction shall be made is what is meant by the date line.

The dates in use upon most of the Pacific Islands and groups of islands are those which result from those carried by the first European or American colonists, these dates differing according as the colonists came from the east or the west. But, this is not time universally, because arbitrary changes are known to have been made in a number of cases, such as Alaska, the Philippines, etc. When Alaska was first colonized by the Russians it had the Russian date. When American settlers moved there, they carried with them the date of the United States which led to considerable confusion, the Sunday of the Americans being the Monday of the Russians. In 1867, when the United States purchased Alaska from Russia, the date in use there was made to conform to that used in the United States.

INTERNATIONAL INSTITUTE OF AGRICULTURE, a world organization, with headquarters in Rome, Italy, founded in 1905, and having for object the collection and dissemination of knowledge relating to agriculture in the various countries represented in the institute. In 1904 the idea of such an institute came to Mr. David Lubin (q.v.) of Sacramento, Cal., and his project found favor with the king of Italy. The latter gave a building in Rome and an annual income of $60,000. The king called the first congress in 1905, and delegates attended from 40 countries. At the congress a treaty was formed making the institute a permanent organization and defining its scope and activities. The government of the institute is vested in the general assembly of delegates from affiliated countries, meeting every two years, and in a permanent executive committee, on which there is one representative from each country. This permanent committee has direct charge of the institute. The general officers are the president, who is also chairman of the permanent committee; the vice-president and the secretary-general. The work of the institute is divided among four bureaus: (1) The bureau of the secretary-general; (2) the bureau of general statistics; (3) the bureau of agricultural intelligence and plant diseases, and (4) the bureau of economic and social institutions. The bureau of the secretary-general has charge of the personnel, financial and other routine business, the building and its equipment, the printing and distribution of publications, the library and general bibliographical work, and, as a more recent service, the preparation and publication of an annual compilation of agricultural legislation in the different countries of the world. The bureau of general statistics collects, collates and publishes statistics of production and commerce in agricultural products, both animal and vegetable, throughout the world. The bureau of agricultural intelligence and plant diseases collects and publishes information regarding the progress of scientific and experimental investigations and practical experience in agriculture throughout the world and, as a branch of this work, gives special attention to the diseases of plants and to entomology. The bureau of economic and social institutions collects and publishes statistics and general information regarding agricultural cooperation, insurance and credit, together with other matters relating to the economic and social organization of rural communities.

Those publications of the institute which have a bearing on the formation of the price of the staples (such as crop reports and data on exports, imports and stocks) are based exclusively on official information, supplied direct to the institute by the adhering governments. The other publications are produced from the following sources: (a) Information officially communicated by the governments; (b) original articles contributed by eminent authorities designated by the adhering governments; (c) excerpts and abstracts of articles translated from the 2,225 official and unofficial periodical publications of the world received by the institute.

The institute prints and publishes two annuals and three monthly and one weekly bulletins, together with a considerable number of monographs on special subjects. The annuals deal with agricultural statistics and legislation, respectively; the monthly bulletins are on (1) agricultural statistics; (2) agricultural intelligence and diseases of plants, and (3) economic and social institutions, and the weekly bulletin is bibliographical. The monthly bulletins are published in French, German, English, Spanish, Italian and Hungarian. French being the official language of the institute, the editions in that language are paid for from the funds of the institute. Provision for the edition in the other languages is made by the countries

interested. The Congress of the United States has made an annual appropriation of $5,000 for translating and printing the English edition, the rest of the expense being borne by Great Britain and her colonies. The institute has collected a great library of the world's best in agricultural literature. As the institute becomes more firmly established and its value as an international clearing-house on economic information is more generally recognized it is met with a constantly increasing demand for the extension of its service along the many lines included in the broad movement of our day for agricultural advancement. The annual budget of the institute is now $250,000, contributed by the adhering governments, on the basis of units; thus the contribution of the United States is on the basis of 16 units. Consult 'Senate Document No. 196, 63d Congress, First Session' (Washington 1913), from which the preceding account has been compiled, and 'L'Institut International d'Agriculture' (Rome 1912).

INTERNATIONAL JOINT COMMISSION. See LAKE-TO-SEA COMMISSION.

INTERNATIONAL LANGUAGE, general term applied in modern times to artificial languages designed for facilitating intercourse between peoples whose national languages or mother speeches differ one from the other. These artificial languages aim toward facility of acquirement through general rules which admit of no exception although some are little less complicated than English for example. In this encyclopedia the principal artificial languages are treated under their own headings, as Soldrisol, Esperanto, Volapük, Ro, etc. (qq.v.).

INTERNATIONAL LAW. In the judgment on appeal in the case of the *Zamora* the judicial committee of the English Privy Council said on 7 April 1916, that "A court which administered international law must ascertain and give effect to a law which was not laid down by any particular state, but originated in the practice and usage long observed by civilized nations in their relations with each other or in express international agreement." Practice and usage and international agreement are main sources of international law.

The statement that international law is not law is sometimes made on the ground that international law is not laid down by a sovereign state. It is nevertheless recognized as law by the highest courts of sovereign states. Such recognition is found not merely in recent but in early decisions. Lord Mansfield of England, in 1761, quotes Lord Talbot who says, "That the law of nations, in its full extent, was a part of the law of England." "That the law of nations was to be collected from the practise of different nations, and the authority of writers." (Triquet v. Bath, Burrage, reports, 1478). Lord Russell of Killowen, the Lord Chief Justice of England, in 1896 defined international law as "The sum of the rules accepted by civilized states as determining their conduct toward each other, and toward each other's subjects." Later in 1905 Lord Alverstone, the Lord Chief Justice, in the case of the West Rand Central Gold Mining Company said, "It is quite true that whatever has received the common assent of civilized nations must have received the assent of our country, and that to which we have assented along with other nations in general may be called international law, and as such will be acknowledged and applied by our national tribunals when legitimate occasion arises for these tribunals to decide questions to which doctrines of international law may be relevant." What is true of other states is true of the United States. In 1796 Mr. Justice Wilson of the Supreme Court said, in the case of Ware against Hylton, "When the United States declared their independence, they were bound to receive the law of nations, in its modern state of purity and refinement." In 1900, in the case of the *Paquete Habana,* following in this respect the case of Hilton v. Guyot of 1894, the Supreme Court of the United States said, "International law is a part of our law, and must be ascertained and administered by the courts of justice of appropriate jurisdiction, as often as questions of right depending upon it are duly presented for determination." It must be granted, therefore, that for the courts there exists international law and that this has been recognized for many years and is still recognized.

Naturally international law did not develop till the political entities called states had become fairly well established, as states are necessary parties to international relations. Evidences of some practices which have later received the sanction of international law are found in very early records of the countries of the East. As relations of states became closer, through the spread of commerce and the intercourse developed by the Mediterranean civilization, laws upon matters of common interest were accepted as necessary for the continuance of relations which were regarded as advantageous. In these early laws there was little of what might be called regard for theoretical rights of states. These laws usually grew out of the recognition of practical advantages in a certain line of conduct toward other states. As Rome became dominant there appeared in the law about the Mediterranean a unity due to the concentration of power at a single seat of government. This certainly furnished an example of the possibility of a degree of unity of law for different peoples. This law particularly reached to the relations of individuals in selling, buying, travel, etc. Under Roman jurists theoretical concepts gained influence. *Jus gentium* and *jus naturale* were expounded. The latter as embodying the law in harmony with the fundamental principles of existence had large influence upon the development of the theory of international law in later days and many books combined in their titles the law of nature with the law of nations.

Before Grotius (1583–1645) there were many who wrote upon matters relating to international affairs. Among these are the well-known names of Victoria (1480–1575), Ayala (1548–84), Suarez (1548–1617) and Gentilis (1552–1608). The great work of Grotius, 'De jure belli ac pacis' (1625), formulated and clarified much of what is now called international law. From this foundation Grotius gained the title of Father of International Law. His work influenced the leaders in international affairs almost immediately and the Treaty of Westphalia at the end of the Thirty Years War, 1648, embodied ideas of this great master. To

Grotius all writers acknowledged their indebtedness.

From the days of Grotius different schools began to develop. One school, sometimes called the "naturalists," particularly followed the natural law theories, theories in their harmony or agreement with the inherent forces of the universe. Another school, the "Positivists" looked particularly to customs and treaties for the sources of international law. Aside from those who were commentators upon the work of Grotius, the main contributions were from writers upon special topics, such as the writings of Bynkersholk (1673–1743). The systematic work of Vattel (1714–67) had wide circulation in Europe and in America as did that of the American, Henry Wheaton (1785–1848). With the increase in the number of court decisions involving principles of international law, there has arisen a clearer definition of the field of international law and a recognition of its binding character.

Treaties, particularly since the Treaty of Westphalia of 1648, have embodied international law. Where the same clause occurs in a large number of treaties or when a large number of states are parties to one treaty the principle or principles tend to be generally accepted as law. Such was the case in regard to some parts of the Treaty of Utrecht of 1713 which were repeated in other treaties of the 18th century. The doctrine of the balance of power in Europe as a basis of peace clearly set forth in this treaty was accepted as a fundamental principle in the diplomatic negotiations in Europe for many years. According to Talleyrand a hundred years later in 1813 the balance of power was "a combination of the neutral rights and interests of the Powers, by means of which, Europe aims at securing the following objects:

"1. That no single Power, nor any union of Powers shall have mastery in Europe.

"2. That no single Power nor union of Powers shall be able to infringe the actual possession and recognized rights of any other Power.

"3. That it shall no longer be necessary, in order to maintain the established state of affairs, to live in a state of imminent or actual war, and that the proposed combination shall secure the peace and repose of Europe against the efforts of a disturber by diminishing his chances of success."

If all that had at times been hoped for from the acceptance of this doctrine of balance of power had been realized, law in international relations would have developed much more rapidly.

Another principle that has been embodied in many treaties following the Treaty of Utrecht was in its brief form "free ships make free goods" and there was also coupled with it the principle that "enemy ships make enemy goods." This was a step in advance of earlier practice, particularly of the 17th century, which did not acknowledge that innocent enemy goods under a neutral flag were free from capture. A hundred years later Napoleon claimed that these doctrines of the Treaty of Utrecht had "become through their adoption in subsequent treaties, the common law of nations."

Progress has, however, been made in international law as in other law and in general there has been a tendency to free commerce from restraints. In respect to the treatment of goods upon the sea, the United States which had in the late 18th century but recently come into the family of nations as the first member from outside of Europe, endeavored to obtain complete exemption from capture of innocent private property even if belonging to enemy persons. In the last quarter of the 18th century the principle was even embodied in certain treaties made by the United States, but it did not receive general approval.

While the precedents of the long negotiations leading to the Treaty of Westphalia of 1648 established some clear lines of diplomatic practice, there were many points upon which disputes were common. The disputes sometimes led to personal encounters. As the diplomatic agent was regarded as embodying in the foreign state the dignity of the state which he represented, he endeavored to obtain for himself the place of greatest prominence. He strove for the highest place at the table, the chair at the right of the sovereign on ceremonial occasions, and by fair means or foul to gain precedence. Bribery of officials was common and some of the books of the early 18th century explain the principles of its use. The rivalry of states became at length so keen that it seemed desirable to lay down laws for the precedence of diplomatic agents. The Congress of Vienna of 1815 embodied a conventional agreement which with an addition at the Congress of Aix-la-Chapelle in 1818 made the grade of diplomatic representatives as follows:

1. Ambassadors, legates and nuncios.
2. Envoys and ministers.
3. Ministers resident.
4. Chargés-d'affaires.

This fixing of the grades removed friction that had long existed, as states were expected to exchange representatives of equal rank. The United States did not, however, send abroad agents of the grade of ambassadors till after the Act of Congress of 1 March 1893, authorizing such action on the part of the President.

As freedom of action was essential for the performance of the functions of the diplomatic agent, the principle of inviolability was extended not merely to the person of the diplomat but to his suite, family and hotel or official residence with all the personnel and equipment which might be necessary or reasonably convenient for the proper performance of his functions. He was also entitled to certain honors, such as salutes according to his grade. His prerogatives, if an ambassador, extended to the right to ride in a coach with six horses and outriders and to remain covered in the presence of the sovereign if the sovereign did not remove his hat. Other grades were entitled to lesser marks of respect. The establishing of these rules removed the causes of the ancient contests over rank and dignities and enabled the diplomatic agents to live in harmony and transact the business of the state, receiving the honors not as personal but as for the states which they represented. Each state in sending its representative and in determining his grade determined his rank at the court to which he was accredited. Minor differences have arisen, but for the most part the controversies as to

rank which were common before 1815 have come to an end.

Other problems which were once perplexing in international relations, as for instance, the regulation and later the suppression of the slave trade have likewise disappeared.

Some have taken new form as the use of private vessels in the time of war after the abolition of privateering, and new problems have arisen, as in the regulation of the use of the air. To meet these changes the international law development of the 19th and 20th centuries has tended to become more and more conventional.

The conventional international agreements were at first generally incidental to some other international act as in the agreement fixing the grades of diplomatic agents. The same was true of the Declaration of Paris of 1856 in which it was stated that the plenipotentiaries who signed the Treaty of Paris "considering that maritime law had long been the subject of deplorable disputes . . . cannot better respond to the intentions by which their governments are animated, than by seeking to introduce into international relations fixed principles, in this respect." They accordingly made "the following solemn declaration:

"1. Privateering is and remains abolished:
"2. The neutral flag covers enemy's goods, with the exception of contraband of war:
"3. Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag.
"4. Blockades, in order to be binding, must be effective — that is to say, must be maintained by force sufficient really to prevent access to the coast of the enemy."

The United States and several other powers did not adhere to this declaration, though its principles were generally recognized. The United States wished in 1856, as in earlier and later days, to secure the general exemption from capture of private property at sea.

Agreements reached by states assembled for the purpose of formulating what may be called international law gradually became common. It would seem but natural that the destruction of life without advantage to any state would be one of the early matters of attention as a subject for a formulated international agreement. Yet the first international agreement relating to this matter to receive general assent was concluded in 1864, and known as the Geneva Convention for the Amelioration of the Condition of Wounded in Armies in the Field. The representatives of 12 European states stated in the preamble their purpose to be to mitigate "the evils inseparable from war, to suppress useless severities, and to ameliorate the condition of soldiers wounded on the field of battle." It was a long time for the world to wait for such legislation. This Geneva Convention of 1864, which provided for the immunity of the hospital corps, was not immediately ratified, however. The United States did not adhere to this convention till 1882, and this was the only international agreement of general scope and relating to war to which even the United States became a party before the end of the 19th century.

The Conference of Saint Petersburg followed in 1868 and was attended by representatives from 17 European states, and these agreed upon the Declaration of Saint Petersburg, which denounced among the signatories "the employment by their military or naval troops of any projectile of a weight below 400 grammes, which is either explosive or charged with fulminating or inflammable substances."

The Geneva Convention of 1864 and the Declaration of Saint Petersburg of 1868 related particularly to a state of war. Soon other matter became increasingly the subject of international conferences, and before the end of the 19th century, general conventional agreements had been made and signed by a large number of states acting together upon such matters as an "International Bureau of Weights and Measures" (Metric System), 1875; "International Protection of Industrial Property," 1883; "Protection of Submarine Cables" (in time of peace), 1884; "Exchange of Official Documents, Scientific and Literary Publications," 1886; "Repression of African Slave Trade," 1890; "Formation of an International Union for the Publication of Customs Tariff," 1890; and "Regulations of Importation of Spirituous Liquors into Certain Regions of Africa," 1899. Such international agreements became a part of the written law of nations, but covered only a very small part of the entire field of international relations in peace and war.

There was developing toward the end of the 19th century a belief that by agreement among the states of the world a basis of conventional law could be reached which would do much to alleviate possible friction and even to avoid war. The extent to which this belief was realizable was to be put to the test. While the United States and Spain were still at war, at the diplomatic reception of 12 Aug. 1898, at Saint Petersburg, Count Mouravieff, Russian Imperial Minister of Foreign Affairs, delivered to the representatives of the Powers a communication from His Majesty the Czar. While the nature of the document gave rise to surprise, its character and source demanded immediate attention. Mentioning the competition in development of means of international combat and the effect of this competition upon the states of the world, he proposed an international conference, saying that:

"To put an end to these increasing armaments, and to find means for avoiding the calamities which menace the entire world, that is the supreme duty which lies upon all nations."

The United States replied that:

"Though war with Spain renders it impracticable for us to consider the present reduction of our armaments, which even now are doubtless far below the measure which principal European powers would be willing to adopt, the President cordially concurs in the spirit of the proposal of His Imperial Majesty."

On 11 Jan. 1899 another circular was presented to the Powers containing a tentative program. This program suggested agreement upon (1) limitation of armaments; (2) restrictions upon new methods of warfare; (3) prohibition of firing from balloons; (4) prohibition of submarines and rams; (5) adaptation of principles of Geneva Convention of 1864 to naval warfare; (6) neutralization for vessels saving those overboard after battles at sea; (7) revision of rules of war on land; and (8) acceptance of principles of mediation and arbitration with a view to preventing armed conflicts. Of these eight topics suggested, seven look to furthering peace by limitations upon the conduct of war, and the last topic suggests a quasi-legal method of furthering the movement toward peace.

Following the suggestion of the Czar, repre-

sentatives of 26 Powers met on 20 May 1899, in the House in the Wood at The Hague, and remained in session a little more than two months. This is known as the First Hague Peace Conference. The Conference drew up three conventions, three declarations, one resolution, and six wishes: Conventions: (1) for the pacific settlement of international disputes by means of good offices and mediation, commissions of inquiry and arbitration; (2) regarding the laws and customs of war on land; (3) adaptation of Geneva Convention of 1864 to maritime warfare. Declarations: (1) prohibiting the discharge of projectiles from balloons; (2) the use of projectiles for the diffusion of deleterious or asphyxiating gases; (3) the use of expanding bullets. Resolution affirming the desirability of the restriction of military budgets. Wishes for further consideration of various matters upon which the Conference had not reached agreement. The last topic upon the program suggested by the Czar had become the first convention of the First Hague Conference, or the furtherance of the aim of peace by means quasi-legal in character assumed a foremost place in the results of these deliberations at The Hague; and the first item in the program, the attainment of international peace through the restriction of the means by which each nation had hitherto maintained its rights, viz., effective armament, became the subject of a resolution and a wish. The Conference asserted its confidence in the law as the method for settling international disputes.

Following this conference of 1899 there was a wider interest in the possibility of law for the world. While the Russo-Japanese War of 1904–05 was still in progress, a request was made by those interested that President Roosevelt call another conference. He had already taken the first steps toward such action when advised that the Czar of Russia desired to call the conference and at the close of the Russo-Japanese war the Czar carried out the plan. It was now fully admitted that the work of the First Hague Conference of 1899 had been of great value for the world.

Eight years later, in 1907, a Second Hague Conference further elaborated and formulated conventional agreements, and to this Conference representatives of 44 of the states of the world came, giving ample evidence of the tendency to accept the principle of international legislation. Some of the conventional agreements have been tested in the course of years. The court established for the settlement of international disputes attained a recognized standing. Cases affecting all parts of the world have already been decided and the awards accepted. The Second Hague Conference extended the scope of the law. Among its propositions which have not been adopted as yet into the law of nations was that to establish an international prize court. This proposition was generally approved in principle though a satisfactory method of selection of judges was not devised. To supplement this prize court convention an attempt was made by 10 maritime nations in 1908–09 at the International Naval Conference at London to formulate the laws which the court should apply. The Declaration of London of 1909 embodied the labors of this Conference. This Declaration has not been ratified. It is not merely in these broad national matters that the formulation of the law has progressed, but in recent years many such matters as the following have become subject of general international agreements: literary and artistic copyrights, 1902; sanitary measures, 1903; white slavery, 1904; potent drugs, 1906.

Rights, persons and property, and jurisdiction on land and sea earlier had received attention; in more recent years the use of the air has been the subject of international regulation, as in the conventions of 1906 and 1912. To the last of these conventions the representatives of about 40 non-American political unities affixed their signatures, many of the larger states allowing here, as in some other conventions, participation in the formulation of the law to the divisions of which the state entity was composed. The legislation thus rested upon a broader base than in many conventions of earlier years.

In the application of the law for nations the progress has been exceedingly rapid. Cases which have defied the best efforts of diplomacy for generations, as the North Atlantic Fisheries dispute, have been settled by due process of law in a few weeks. Cases which might have resulted in long and disastrous international contention have been resolved in the light of law. Where recourse to legal settlement of disputes was in earlier times the last resort, it has become the first, and not merely the parties to the controversy may begin the action, but third parties may of right suggest or even try to bring the parties to submit the case to the decision of the court.

It requires only a review of the conventions since 1899 to show how rapid is the formulation of the law for nations. These international laws, in addition to many private matters, cover the pacific settlement of international disputes, limitation of the employment of force in the collection of contract debts, laws for war on land, rights and duties of neutral powers and persons in war on land, status of enemy merchant ships at the outbreak of hostilities, the transformation of merchant ships into warships, the laying of automatic contact submarine mines, bombardment by naval forces in time of war, care of sick and wounded in time of war, rights and duties of hospital ships, exercise of right of capture in maritime war, prohibition of discharge of projectiles from balloons, rights and duties of neutral powers in time of war, the establishment of an international prize court and the law for its guidance.

Not merely had the law developed and become somewhat widely the subject of formal international acceptance, but many of the conventions embodying the law had been put to severe tests. Probably few more serious tests could be imagined than that which one part of the convention for the Pacific Settlement of International Disputes received in 1904 during the Russo-Japanese War. In this convention there had been placed a section providing for a sort of international grand jury called a Commission of Inquiry to investigate the facts in case of a dispute between nations when agreement to resort to such a procedure could be reached. On the night of 21 Oct. 1904, a division of the Russian fleet under Admiral Rozhdestvensky, on its way from the Baltic Sea to the Far East, while passing through the

North Sea near the Dogger Banks, fired on the British fishing fleet. The fishermen suffered the loss of one trawler, five were damaged and two men were killed and six wounded. Great Britain was an ally of Japan and the sympathy in the British Isles was generally with the Japanese. When the news of this disaster spread the demand for action was urgent upon the British government. Orders were issued by the Admiralty to the Mediterranean, Channel and Home fleets, and the British Foreign Office announced on the 25th of October that it had made known to Russia "that the situation is one which in the opinion of His Majesty's Government does not admit of delay." The same day the Czar in a message to the king said "he would take steps to afford complete satisfaction as soon as the circumstances of the case were cleared up." On the following day the Russian fleet arrived at Vigo and reported that the reason for the firing was the presence of Japanese torpedo boats among the fishing vessels. This the fishermen denied. The demand in England for war had a little time to subside and fortunately the method for honorable submission of such a dispute existed in the Convention of 1899, to which Great Britain and Russia were parties, and it was agreed to submit the dispute to a Commission of Inquiry. The commission was composed of admirals from the American, Austrian, French, British and Russian navies. The report of the commissioners was adverse to the Russian contentions and the incident was closed by the immediate payment of £65,000 to Great Britain. Thus a dispute which might have been regarded as an ample cause for war was by peaceful methods settled promptly and honorably.

This provision for commissions of inquiry was elaborated in 1907, that it might, if occasion arose, become even more serviceable.

Another Convention of 1899 prohibited the discharge of projectiles or explosives from balloons for a period of five years. While this period expired during the Russo-Japanese War, both Russia and Japan continued to observe the spirit of the prohibition.

The rules for war on land were also tested and further changes were found necessary in 1907.

Not merely was there made in 1899 provision for a commission of inquiry but also for a court of arbitration. It was thought for a time that this court would never perform any function. It remained for two American republics to first test the court of arbitration, for which provision had been made in the Convention of 1899. In 1902 the United States and Mexico took before the court its first case.

This was the case of the Pious Fund of the Californias, which had been in dispute from the annexation of Upper California in 1848 by the United States. An arbitral award in 1875 had granted to the United States claimants 21 years' interest on one-half the Fund which had originally been given to the missionaries for their work in the Californias. The interest for subsequent years had not been paid and it was claimed by the Catholic Church of California. The contention of the United States was upheld by the court and the protracted dispute was at an end.

Other cases came to The Hague court after this first award and it soon became customary for states to request that in case of dispute "the matter be referred to The Hague."

The next case related to the preferential treatment for the powers which had blockaded Venezuelan ports in order to enforce the payment of debts due their citizens. Here not two but ten states were involved, representing Europe, North America and South America. This case was quickly followed by one in which Germany, Great Britain and France appeared against Japan in the matter of the perpetual leases in that country, thus introducing Asia also before the court. Another case involving Asiatic interests was the case of the right of the Muscat Dhows to fly the French flag, which was a subject of difference between Great Britain and France.

These four cases were before the court at The Hague between 1902 and 1905. In 1907, at the Second Hague Conference, the convention relating to the court was amended and extended to meet the needs which experience had demonstrated.

The first case under the revised convention was settled in 1909, the Casabianca case, which had brought France and Germany to the verge of war. The same year the controversy over the maritime boundary between Norway and Sweden was adjusted.

In 1910 the court attempted to settle the dispute between the United States and Great Britain over the North Atlantic Fisheries. This dispute had continued in varying forms for about 100 years. Diplomatic negotiations had failed many times. Within a few weeks a decision accepted by both parties was reached by the court.

Questions of national honor and fundamental rights were considered in such cases as the case of Savarkar in 1910, the case of the *Manouba* and of the *Carthage* in 1913, and various aspects of financial claims in those of the Orinoco Steamship Company in 1910 and the interest on Russian indemnities in 1912. In June 1914 The Hague Court made an award settling the land boundaries in the island of Timor.

The range of cases settled by the court is accordingly very wide. The frequency of resort to the court was rapidly increasing. Interests involving the Americas, Europe, Asia, Africa and the area near Australia had been considered. Seventeen of the 44 states represented at the Second Hague Conference had appeared at least once and some six times before the court at The Hague. The awards of the court had in every instance been accepted in good faith and observed.

Such progress in the substitution of law for other means of settling disputes was a marked evidence of the advance of the early 20th century. While other methods may for a time be tried, the decision in the case of the *Zamora* before the judicial committee of the English Privy Council on 7 April 1916, seems to show that the only sound basis for international relations is in respect for international law. See ARBITRATION, INTERNATIONAL; ARMED NEUTRALITY; BLOCKADE; DECLARATION OF LONDON; DECLARATION OF WAR; MERCHANT VESSELS, NEUTRAL, RIGHTS OF; NEUTRALITY.

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INTERNATIONAL LAW, Changes in. During the 50 years preceding the outbreak of the European War in 1914, international law, which originally consisted of a more or less indefinite mass of custom, usage and opinion, underwent a remarkable development. Much of that which was unwritten and uncertain was reduced to writing, embodied in conventions and given the character of definiteness and precision. Many new rules dealing with matters hitherto unregulated by custom were also elaborated and embodied in international treaties and conventions. The Declaration of Paris (1856) and of Saint Petersburg (1868), the Geneva Conventions of 1864 and 1906, the 16 conventions of the two Hague Conferences of 1899 and 1907 and the unratified Declaration of London of 1909, constituted a great body of written law, embodying not all, but the larger portion of the rules of conduct observed by states in their relations with one another, both in war and in peace.

At the outbreak of the European War, the most important of these international acts, the conventions of the Second Hague Conference, had been ratified by all the important powers of the world, although in some instances certain states had reserved their ratification of particular articles. Several of the conventions, however, contained a stipulation that their provisions should not apply in time of war, except between the contracting parties, and then only when all the belligerents were parties thereto. Among the belligerents in the recent European War, Bulgaria, Italy, Montenegro, Serbia and Turkey have not ratified the conventions, in consequence of which they were not legally binding on any of the powers involved in the war. There was a general feeling, however, that the failure of a few states, most of which were petty powers, to ratify the conventions should not be allowed to defeat their purpose, and it does not appear that any belligerent took advantage of the fact that the conventions were not legally binding upon it to avoid the obligations which they created. Thus the British prize court has uniformly taken the position that although it was not legally bound by the terms of The Hague Conventions for the reasons mentioned above, it would nevertheless act as if they were binding, and would therefore in dealing with the claims of German subjects accord them the benefit of any convention which Germany had ratified.

While happily there was no disposition among the belligerents to take advantage of the circumstance that The Hague Conventions were not technically binding to escape the obligations which they impose, many of the provisions of the conventions, to say nothing of customary rules which had become firmly established, were disregarded on the pretext of military necessity or on the theory that the changed conditions of warfare and the introduction of new methods and agencies had rendered them obsolete or made conformity to their prescriptions no longer obligatory. The deliberate violation of the neutrality of Belgium by Germany and the characterization of the Belgian neutrality treaty as a "scrap of paper" was soon followed by various other acts which created the impression that Germany proposed to disregard every rule of international law which stood in the way of her military success. Other belligerents refused to be bound by certain rules of international law on the theory that the obligation to conform to its prescriptions are reciprocal, and consequently the refusal of one to observe the law released its adversaries from the duty of obedience. Still other violations were defended on the alleged right of retaliation. So numerous were the instances of non-conformity to The Hague Conventions as well as the unwritten usages and practices of the past that many persons publicly asserted that the whole body of international law had broken down if it had not actually ceased to exist. It is true that the period of the war was a crisis for international law; never before had it been subjected to so severe a test, but in a war of such gigantic proportions, characterized by the most extreme bitterness, and conducted largely according to new methods and with new agencies, it was inevitable that many rules formulated for the conduct of war under widely different conditions should have been disregarded if not repudiated outright by the belligerents. Nevertheless, this constituted no valid ground for holding that the whole fabric of international law had collapsed any more than arguing that a breakdown in the administration of a criminal law involves the subversion of the entire criminal code. While all the belligerents undoubtedly contravened certain of the well-established rules of international law during the European War, the most flagrant violations were committed by a single power, and not even it went so far as to repudiate those rules or deny their existence. Their existence was indeed readily admitted, but their binding effect was denied on grounds of military necessity, changed conditions or the alleged refusal of the enemy to conform to their prescriptions. The great body of international law, therefore, although strained and disregarded in many instances, still remains intact, and no belligerent has ever proposed that it be thrown overboard and war conducted without regard to the established conventions and usages. As Mr. Coleman Phillipson, a well-known English writer, well says: "International Law has not

been destroyed. Despite the numerous breaches we need not despair of its future. Its inherent vitality will never, and never can be entirely destroyed. Notwithstanding the many wounds inflicted upon it, it will rise again helped and invigorated and will assume its inalienable dominion over the society of states. Its rules rest upon the permanent necessities of intercourse between nations." Indeed, there is good ground for believing that one of the results of the tremendous conflict which has so rudely shaken the structure will be an infusion of new life and strength into its body. Speaking on this point before the American Society of International Law in March 1916, ex-Senator Elihu Root said:

"Vague and uncertain as the future must be, there is some reason to think that after the terrible experience through which civilization is passing there will be a tendency to strengthen rather than abandon the law of nations. Whatever the result may be, the world will have received a dreadful lesson of the evils of war. The sacrifice of millions of lives, millions homeless and in poverty, industry and commerce destroyed, overwhelming national debts,—all will naturally produce a strong desire to do something that will prevent the same thing happening again."

Mr. Root added that the return of peace will find us living in a different world. "Universal mourning for the untimely dead, suffering and sacrifice, the triumph of patriotism over selfishness, the long dominance of deep and serious feeling, the purifying influences of self-devotion, will surely have changed the hearts of the nations, and much that is wise and noble and for the good of humanity may be possible that never was possible before."

Under these conditions may we not expect, instead of a desire to repudiate a system by which differences may be settled peaceably or to throw overboard the body of law by which the rights and obligations of nations are defined and guaranteed, that a more widely diffused and strengthened sentiment in favor of a more effective and enforceable body of law will be created throughout the world?

Although it may be confidently assumed that the great body of international law will emerge from the welter and chaos of the war in the main intact, it is true that the war has revealed in a striking manner some of its inherent weaknesses and deficiencies, as no preceding conflict ever did. It has been shown that "a decent respect for the opinions of mankind" and the obloquy which comes from nonconformity to the established rules, in short the desire of belligerents to have the approval of the public opinion of the civilized world, is not yet an effective sanction of international law. It has been shown that the rules of international law like the rules of municipal law must have sanctions behind them, that is, their violations must be followed by punishment. There must be some power stronger than the violator which is capable of bringing him to book and of punishing him for his unlawful acts. Article 3 of Convention IV of the Second Hague Conference undertakes to fix a responsibility for the violation of the rules laid down by the convention. It declares that "the belligerent party who violates the provisions of the said *réglement* shall be held to make an idemnity, if there is a place for it" and that "he shall be held responsible for all acts committed by persons constituting a part of his armed force."

Unfortunately, however, the convention provides no machinery or indicates no method of enforcing the responsibility thus proclaimed. If, therefore, the purposes and objects of international law are to be fully realized, some means of enforcing its prescriptions and of compelling states to fulfil the obligations which it imposes must be found. What under the strain of a world-wide conflict has proved to be little more than a code of etiquette must be transformed into a body of real law, violations of which by particular states may be effectively punished. This is the great task to which publicists and international jurists will have to turn their attention after the close of the war if international law is to be strengthened and made to fulfil its purposes.

One proposal that has been widely discussed since the outbreak of the war is the organization of a league of states to enforce the preservation of peace and the observance of international obligations. This proposal contemplates a resort to commercial boycotts, non-intercourse measures and possibly the application of force against a state which commits a breach of the peace, commits an aggression against a member of the league, or otherwise violates its international duties. It is quite true that there have been instances in which a combined policy of non-intercourse against a powerful state would have deterred it from making an unjust attack against another power or from disregarding its international obligations, but there have been other instances when it would have probably proved ineffective. The application of force against a delinquent state is an even more extreme measure. It necessarily implies the maintenance of an international police force to compel states to observe the rules of international law. As such it involves serious difficulties, for obviously the force required to coerce effectively any one of the great powers of Europe with their huge powerful military establishments would necessarily have to be larger than anything we are accustomed to think of under the term "police." It is well known, for example, that France, single handed, held out for more than 20 years against a coalition of all the great powers of Europe and although finally overcome, emerged from the contest with her national boundaries little diminished.

A form of sanction recently proposed by a group of French jurists contemplates the application of the criminal law to individual violators of the rules of international law. Thus if a military or naval commander is charged with allowing those under his command to commit pillage, maltreat prisoners, kill non-combatants, sink a merchant vessel without warning or with violating other well-established rules of war law, he shall be traduced before the criminal courts and tried according to the procedure of the criminal law, or in case he does not fall into the hands of the authorities he will be tried *in absentia* and in case he is subsequently captured the punishment prescribed by the criminal law will be imposed. Like the other proposals suggested, this one would prove of doubtful efficacy in practice,

and grave practical difficulties would be encountered in the effort to apply it.

One truth has been clearly established by the results of the European War, namely, that a different attitude should be adopted by the nations toward violations of the rules of international law by a particular state. This attitude should be that which the community adopts when its own law has been transgressed by an individual. In that case the injured victim is not left to redress his own injury, but the community which has itself been injured by the violation of the law intervenes and punishes the act. Heretofore nations, however, have acted on the theory that when a rule of international law has been violated it is of no concern to any state except the particular one immediately wronged, and therefore they are strangers to the controversy. As ex-Senator Root has well said: "If the law of nations is to be binding, if the decisions of tribunals charged with the application of that law to international controversies are to be respected, there must be a change in theory, and violations of the law of such a character as to threaten the peace and order of the community of nations must be deemed to be a violation of the right of every civilized nation to have the law maintained and a legal injury to every nation. When a controversy arises between two nations other nations are indeed strangers to the dispute as to what the law requires in that controversy, but they cannot really be strangers to a dispute as to whether the law which is applicable to the circumstances shall be observed or violated. . . . International laws violated with impunity must soon cease to exist and every state has a direct interest in preventing those violations which if permitted to continue would destroy the law. Wherever in the world the laws which should protect the independence of nations, the inviolability of territory, the lives and property of their citizens, are violated, all other nations have a right to protest against the breaking down of the law. Such a protest would not be an interference in the quarrels of others. It would be an assertion of the protesting nation's own right against the injury done to it by the destruction of the law upon which it relies for its peace and prosperity."

Until this change of attitude has been adopted by the world, nations will be free to observe or disregard at will the prescriptions of international law without fear of punishment except such as the particular aggrieved state may be able itself to impose. Under modern conditions the existing theory is wrong in principle, for the subversion of the law by one state necessarily destroys the protection which the law intended to provide for all states.

While the idea advanced by some persons of high repute that the whole body of international law has been discredited if it has not actually collapsed under the strain of the Great War cannot be admitted, it is nevertheless true that the war has conclusively demonstrated that certain of its rules will need to be altered while others will have to be abandoned because they have become obsolete. The introduction of the submarine, the mine, the torpedo, aerial craft and wireless telegraphy as instruments of warfare, to say nothing of other changes in the methods and conditions of conducting war, will necessitate a revision of the war code along various lines. Thus the employment of the submarine and mine in naval warfare has demonstrated the impracticability of the old form of close blockade with its cordon of ships in the immediate offing of the blockaded port. The American Secretary of State in a note of 5 March 1915, to the United States Ambassadors at London and Paris, stated that the government of the United States was prepared to admit that modern methods of naval warfare, and particularly the use of the submarine for defensive purposes, might make the institution of a blockade according to the old rules a physical impossibility. In other words, the "long range" blockade in which blockading craft is permitted to remain out so as to be beyond the range of torpedo boats or mines will have to be recognized as legal. Moreover, it is not altogether improbable that if the right of belligerent blockade is to be retained, a belligerent whose adversary is so circumstanced that he may easily draw oversea supplies through the ports of an adjacent neutral country, must be allowed a limited power of blockade in respect to such neutral ports, otherwise with present railway facilities the right of blockade if restricted to enemy ports will in many cases be useless. Thus the World War has shown that if the British right of blockade had been confined strictly to the ports of the enemy it would have been of little value to Great Britain because Germany could import unlimited supplies from America through the neutral ports of Holland, Denmark and Sweden.

Likewise, the old rules relating to contraband will need alteration. The results of the World War have largely demonstrated the unsoundness if not the ineffectiveness of the existing rules in respect to the carriage of contraband, and particularly those governing the destination of conditional as opposed to absolute contraband. Most of the rules formulated in the Declaration of London in regard to hostile destination are vague and some of them are illogical and rest upon no sound principle of reason or expediency. So the old rules governing the right of search have broken down in practice. According to the contention of the American government in the controversy with Great Britain in regard to British restraints on American commerce, the right of search can be exercised only on the high seas at the time and place of capture, and ships cannot be taken into port for further examination on suspicion not amounting to conclusive evidence. But the recent war has shown that with the increased size of ships and the magnitude of their cargoes, effective searches in many cases cannot be made on the high seas, and the vessels must therefore be carried into port where their cargoes can be unloaded and each parcel carefully examined. A new practice which may be confidently expected will be the furnishing of neutral vessels with certificates by representatives of the government under whose supervision the loading is done, declaring that the cargo is innocent. This done, the necessity for harassing searches, deviations to distant ports and ruinous delays to shippers will disappear.

The employment for the first time on a large scale of submarine vessels, submarine mines, asphyxiating gas and aerial craft has

raised new and difficult problems, for the regulation of which there are either no existing rules or rules which are inadequate. One of the tasks which the war will bequeath to the international jurists of the future, therefore, will be the formulation of new rules or the modification of such rules as exist, in respect to the employment of these agencies.

The failure of the powers to ratify the Declaration of London leaves the law in respect to the transfer of flags, domicile, nationality and other matters largely in a chaotic state and further international legislation dealing with these matters will be necessary. The unprecedented encroachment upon the rights of neutral states which has marked the conduct of the World War should and doubtless will lead to the adoption of new and more effective rules for safeguarding neutral rights. The American Institute of International Law at its first meeting held in Washington in 1916 adopted a series of declarations defining the attitude of the American countries in respect to the rights of neutral states.

The wholesale internment in concentration camps by the belligerent states of the alien enemy population found within their territories at the outbreak of the war — a measure without precedent in the wars of the past — has given rise to the question of the treatment which a belligerent may legitimately mete out to such persons. This matter is unregulated by convention and should receive attention when the time arrives for revising and amplifying the existing rules of international law.

It is impossible within the brief compass of this article to discuss all the possible changes in the law of nations which will be made necessary or desirable in consequence of the new conditions of warfare and the employment of new methods and agencies of combat. That they are numerous and important must be evident to every student of the history of the war on its international law side. There is one contention, however, that must be emphatically rejected. It is the claim put forward in Germany in connection with their methods of submarine warfare, namely, that the resort to a forbidden practice is lawful provided the instrument used is of such a character that it cannot be used in conformity with the rules of law; in short, that a military or naval commander who owing to the peculiar construction of the agency which he employs cannot conform to the established law and practice is relieved from all obligation to observe the rule.

The invention of new instruments and methods of war will undoubtedly necessitate certain modifications in the existing body of war law, but it must be confidently assumed that the world is not prepared to admit that the long established rules of law devised in the interest of the sacred principles of humanity must be sacrificed in order to enable belligerents to employ agencies of destruction which cannot be employed without violating those rules. Whatever changes are made in other respects, the laws of humanity and justice which have received the common assent of mankind must remain unaltered and the employment of new inventions must conform to those laws or they must be discarded. Conditions are always changing and new and more powerful agencies of destruction are constantly being invented. If the rules of international law founded on considerations of humanity cease to be binding whenever conditions change or whenever new agencies of warfare are invented, it would be a play upon words to describe such a body of rules as a system of law. The same opinion must be held in regard to the contention put forward in Germany that military necessity knows no law, that whenever a belligerent interest conflicts with an established rule of law the rule may be disregarded. This doctrine of *Kriegsraison* as it is known in Germany is based on the view that a belligerent is bound by the laws of war only so long as they interpose no obstacle to the accomplishment of the objects of the war. If this theory should be admitted and sanctioned by international agreement by the powers it would be a surrender of much which civilization has gained during the past two centuries. There is no likelihood that it will be done. Consult Phillipson, C., 'International Law and the Great War' (New York 1916).

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INTERNATIONAL PEACE CONFERENCE. See HAGUE COURT, THE.

INTERNATIONAL PEACE MOVEMENT, The. A world-wide movement aiming at the abolition of war, more especially international war. While fighting has always been one of the chief occupations of mankind; while ideas of national greatness are largely associated with battles, campaigns and sieges; and while the heroes of poetry, history and monumental art are mostly famous soldiers; in modern times, nevertheless, the opinion has rapidly gained ground all over the world that war is a terrible evil which ought to be prevented as far as possible, and sooner or later to be done away with altogether. Some writers, notably in Germany, defend it as a biologic necessity, contending that it is a phase of the universal struggle for existence and hence a part of nature's plan for securing race hardihood and keeping the growth of population within bounds. (See MALTHUSIANISM). Others, again mainly Germans (particularly Prussians), even glorify it as the noblest of human activities, a divinely ordered means of preventing the inhabitants of the world from becoming effeminate, pleasure-loving and morally flaccid. To this argument, however, the opponents of war reply that co-operation is just as much a part of nature's law as fighting, and that intertribal slaughter is a human specialty virtually unknown to the lower animals, among whom individuals attack and kill one another only for food. As for the moral benefits of war, moreover, it is urged that these come also from fire, flood, famine, earthquake and pestilence, which nobody thinks of listing among the good things of life; to a certain extent, also, good by-products come from dueling and private brawling, which almost everybody admits it is well to have got rid of.

Aside from the few extremists who extol war as a good thing, and those at the other pole who denounce it as the sum of all villianies and something to be avoided at any cost, the great mass of thoughtful men regard it as indeed an evil, but as sometimes a necessary

and praiseworthy alternative to still greater evils. They hold that slaughter and destruction on a large scale, with all of the attendant suffering and misery, constitute ethically the most inhuman, rationally the most absurd, and economically the most expensive mode of settling international conflicts of opinion and interest. Accordingly, they are working to bring about a form of world-organization in which the nations shall co-operate to abolish this ancient scourge and at the same time find a moral equivalent for its valuable by-products. In the year 1910 the well-known philanthropist, Mr. Andrew Carnegie, whose generosity rendered possible the creation of the great institution known as the Carnegie Endowment for International Peace, summed up the present-day attitude toward war by calling it "the foulest blot upon our civilization"—a characterization amply warranted by the colossal struggle of the World War, unless that struggle shall eventually prove to have been indeed a war against war.

This new attitude of aversion toward war is a part of the great humanitarian movement which set in shortly before the French Revolution. War violates the Rights of Man—the right to life, liberty and the pursuit of happiness. Its immediate effect is the destruction on a large scale of life itself, which has come to seem more precious than it used to seem, and also of many of the values, both material and spiritual, which ennoble life and make it worth living. It replaces the orderly constructive processes of society with an orgy of destruction, treating the common man as mere cannon-fodder, while its immediate benefits fall to only a few leaders who get their reward in "glory" or increased wealth and power, that is, in the gratification of their vanity.

In spite of all that, however, it is generally recognized that a brief frenzy of successful war *may* avert from a whole nation a long era of dependence, oppression, humiliation and economic misery. Hence war, particularly defensive war, sometimes justifies itself to the humane and philosophic mind as a preparation for a better time to come—it is a paroxysm in which the men and women of a particular nation and epoch sacrifice themselves for the sake of their descendants. Consequently sensible and conscientious peace-workers have no sympathy with the doctrine of "peace at any price," but look upon peace rather as a by-product of freedom and justice, a state of affairs rendered desirable not merely by the absence of war, but by the presence of conditions that make for human welfare and happiness—conditions oftentimes not to be established by any other means than war itself. In his book entitled 'A World in Ferment' Dr. Nicholas Murray Butler expresses himself regarding peace as follows: "Peace is not an ideal at all; it is a state attendant upon the achievement of an ideal. The ideal itself is human liberty, justice, and the honorable conduct of an orderly and humane society. Given this, a durable peace follows naturally as a matter of course; without this, there is no peace, but only a rule of force until liberty and justice revolt against it in search of peace." It is necessary to distinguish, therefore, between the practically minded workers for international peace, who seek definite remedies for definite dangers and evils, and the radical pacifists, who condemn and denounce all war under all circumstances. In 1918 the sentiment of the influential and far-sighted peace-workers of the nations allied against Germany was almost unanimous in favor of a vigorous prosecution of the war to a victorious conclusion, that being considered the shortest and surest road to an enduring peace.

In view of the fact that war is only a means of overcoming a difficulty that exists between two more or less powerful groups, its abolition of course presupposes the substitution of some other means to that end. For we have no reason to expect that controversies between nations will ever entirely cease to arise, any more than we have reason to suppose that quarrels between individuals will ever come absolutely to an end. The fact of the matter is, indeed, that man is naturally a fighting animal; his instinct impels him to attack any fellow-being who provokes him or stands in the way of the realization of his desires or the obtainment of what he considers his rights. History and experience prove, moreover, that destructive wars, no less than private quarrels, sometimes originate in trivial causes which might have been removed.

Thus the International Peace Movement takes it for granted that controversies between nations are inevitable, and concerns itself with creating a state of affairs wherein nations will not hastily resort to war for the purpose of settling their disputes or achieving their ends. Its aim, in other words, is to gain time for discussion and the cooling of passion, and then to provide peaceful, legal and therefore honorable ways of adjusting differences. This is frequently done by diplomacy, many imminent wars having been happily averted by peaceful negotiations conducted by duly authorized representatives of the opposing groups. But diplomacy usually involves compromise, which, in turn, implies a willingness on the part of the disputants to make reciprocal concessions in the interest of peace. When a compromise cannot be effected and diplomacy is unable to bring about a settlement, the opposing groups have but three alternatives to choose from: (1) they can leave the question(s) at issue unsettled; (2) they can go to war; (3) they can submit the question(s) to an impartial court of arbitration for a decision in accordance with the principles of justice and reason. The first is always unsatisfactory, sometimes dangerous and not infrequently impossible; the second is coming to be considered more and more a hideous anachronism; and the third is the primary object of the movement under consideration.

The sentiment of the world at large against war is by no means of recent origin, although it has been greatly quickened during the past generation by reason of the fact that armed conflicts between nations involve no longer relatively small numbers of fighting men, but whole vast populations, combatants and non-combatants alike, with the result that they are more destructive and calamitous than ever before. It is true, however, that there have always been individual writers, Utopian dreamers, who were opposed to the settlement of contro-

versies by force, not only because they were shocked by the suffering thus caused, but also because they saw that war outraged justice and substituted might for right. But while denunciations of war on these and other grounds have come down to us from the earliest days of recorded history, and are of comparatively frequent occurrence in ancient, mediæval and early modern literature, suggestions as to efficacious means of avoiding it, that is, as to acceptable substitutes for it, are relatively few and far between. The idea of resorting to arbitration has been envisaged by many high-minded and public-spirited men, but only here and there do we find feasible schemes for putting that idea into practice. Moreover, even if a few projects not altogether hopeless were proposed, they could not be put into effect until a large public sentiment was created in their favor. For as long as the popular masses remained ignorant of or indifferent to the evils of war, regarding it as glorious or as concerning a comparatively small number of leaders and fighting men, it was impossible that sporadic proposals looking toward the peaceful settlement of controversies and emanating from a few enlightened leaders of thought should lead to any practical results.

It is not strange that mankind has been very slow to realize that any controversy or difficulty which can be settled at all can be settled by law as well as by force. It has taken countless ages to do away with private brawling, and the world is by no means entirely rid of it yet. The truth is that war, in a certain sense, is a "time-honored institution," that is, nations have always been in the habit of attacking one another whenever they have considered such action either necessary or desirable, whenever the war-passion has been aroused. Ancient action-patterns have developed in the nerve-substance of the human animal, so that when a stimulus is offered in the form of a real or imagined danger, or an insult, or a provocation of any kind whatsoever, we clench our fists or seize our weapons and get ready to fight, just as another sort of stimulus will move us to eat, or to tremble with fear of ghosts, or to seek the gratification of our sexual instinct. It has been shown that most wars, historically, result from land-crowding, need of expansion-room, but according to modern conceptions of right and wrong a nation which seeks to acquire territory belonging to another nation by force commits a crime analogous to that of the individual who steals his neighbor's corn and justifies the theft on the ground that he was hungry. However that may be, it is not to be denied that fighting is an ingrown habit and not a rational activity, and that the impulse to fight can be counteracted only by a long and slow process of education; at the same time, however, that education must provide a moral equivalent for war, lest enduring peace shall result in converting men from lions into sheep.

However we explain the phenomenon or account for its development, the fact remains that the sentiment against war has of late become more general and more insistent, with the result that at the present time the advocates of peaceful settlement are found in all classes of society and are becoming numerous enough to exert an important influence upon national and international affairs. Not only are enlightened peace-workers of many kinds (statesmen, philosophers, juris-consults, economists, journalists, historians, poets, scholars) constantly giving oral and written expressions to their views all over the world, but whole parties and sects have adopted the abolition of war (universal disarmament) as one of the main planks in their platforms. Moreover, constructive minds are everywhere engaged in advocating measures and developing plans for bringing about the substitution of a peaceful and legal procedure for war as a means of settling differences that threaten to involve nations; and the increasing number of international congresses and conferences held for the purpose of effecting a general agreement concerning all sorts of economic, commercial, political and social questions bears witness to the success of the efforts that are being put forth to the end of removing the causes known to be responsible for disastrous conflicts resulting in the wholesale destruction of life and property.

Since the beginning of the 19th century numberless peace societies of one kind and another have been created in different parts of the world, most of them without sufficient resources at their disposal for carrying on very extensive propaganda, but some of them large and wealthy enough to make their influence felt in the counsels of world politics. These peace societies, the first of which was founded in New York in 1815, and the second in London in 1816, may be called the mainspring of the International Peace Movement, since their membership includes the most prominent workers in all countries, and since they are constituted for the express and exclusive purpose of dealing with questions of war and peace. To a considerable extent they co-operate with one another, and while their policies and methods differ more or less, their objects, generally speaking, are identical and may be summarized as follows: (1) to educate public opinion regarding the evils of war and the advantages of peaceful settlement; (2) to advocate friendly agreement and co-operation in the regulation of matters affecting the family of nations; (3) to promulgate and popularize plans for the abolition of war and the perpetuation of peace; (4) to create in favor of such plans a public sentiment such as will incline responsible statesmen to apply them, with the necessary modifications, to the existing political conditions; (5) to bring about, ultimately, the establishment of an International Council or a Permanent Court of Arbitration to which all questions arising between nations shall be submitted by compulsion for adjudication on the basis of a universally accepted International Law.

It would be extremely difficult, if not impossible, to make out a complete list of the peace societies that have sprung into existence all over the world in the course of the last few decades, and especially since the beginning of the great World War in 1914. The fact of the matter is, indeed, that almost every little town, especially in the United States, has its peace society, so that there are literally hundreds of them. 'The International Peace Year-book' (1915), published by the National Peace Council (established in England in 1905

by the Second National Peace Congress of Great Britain and Ireland "to effect a closer union of the [British] societies, and to assist them in a sincere and earnest promotion of the world's peace") contains a list of peace societies covering some 40 pages; most of these mentioned do not claim an international character, however, while many of those which claim it scarcely possess it. Suffice it to say, accordingly, that there are at least 10 or 12 larger organizations, of which the Carnegie Endowment for International Peace may be called one of the most important, whose membership comprises the leaders of the peace movement in all countries of the civilized world, and whose activity is therefore truly international.

The question as to whether the world will ever be entirely rid of war is one which nobody can answer. It is "a consummation devoutly to be wished," but it is by no means a foregone conclusion. If perpetual peace ever reigns on earth, it will be, as stated above, the result of a long and slow process of education. This may take a great many years, and meanwhile the stormy passions that make for war demand immediate action. Certain it is, at all events, that acceptable substitutes for war cannot be created over-night and the habit of resorting to arbitration for the settlement of international differences cannot be generated on the spur of the moment. Every day, however, the International Peace Movement is gathering more and more adherents and acquiring more and more momentum, and it is more than possible that this will ultimately result in the creation of a world-wide public sentiment strong enough to bring about the definitive banishment of the scourge of war from among civilized peoples.

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INTERNATIONAL TRADE. See COMMERCE, HISTORY OF; COMMERCIAL GEOGRAPHY; COMMERCE OF THE WORLD.

INTERNATIONAL UNIONS FOR THE PROTECTION OF PROPERTY. **(1) International Union for the Protection of Industrial Property,** an organization with headquarters at Berne, Switzerland, which dates from 1880, and its first conference that year held in Paris, followed by another in 1883; Rome, 1886; Madrid, 1890 and 1891, and Brussels, 1899–1910. The work of the Union was brought prominently before public notice in the United States when the delegates met at Washington, 15 May 1911, to consider amendments and revision to the Treaty of Paris of 1883. President Taft selected five men prominent in the world of patents to represent the United States: Hon. Ed. B. Morse, Commissioner of Patents; Mr. F. B. Fish, Mr. Charles Duell, Mr. Melville Church and Mr. Robert H. Parkinson. The deliberations of the conferences are secret, and final texts of treaties as amended are not given out until ratified by the various nations represented.

The convention signed at Washington 2 June 1911 was ratified by representatives of Austria-Hungary, Dominican Republic, Spain, United States, France, Great Britain, Italy, Japan, Mexico, Norway, Netherlands, Portugal, Switzerland and Tunis. Five governments adhering to prior conventions which did not ratify were Belgium, Brazil, Cuba, Denmark and Sweden. Twenty other nations had been invited to take part and become adherents to the Paris Treaty of 1883 and its subsequent amendments, but did not respond. There was, however, evidence of increasing interest in the Union on the part of non-adhering countries. The date of the next conference to be held at The Hague was postponed indefinitely on account of the great European War.

(2) International Society for the Protection of Private Property.—A society reported 17 July 1916 as formed with headquarters in Zürich, Switzerland, to look after the interests of persons who own property in enemy countries which is liable to confiscation or enforced administration by the governments of warring nations. The Society pledges itself to try and persuade the respective governments to release the requisitioned property of enemy subjects, and also to take care of the interests of their colleagues, whenever possible. The members of the Society include a great many rich persons threatened with impoverishment in both of the warring groups, and several leading jurists in neutral countries interested in the problem that has arisen of private property having to protect itself against the state, which, according to current belief, should be the first protection of private property. The Society does not limit its activities to mere protests, but uses the most radical measures in case of necessity.

INTERNATIONAL WATERWAYS COMMISSION. See LAKE-TO-SEA COMMISSION.

INTERNATIONAL WORKINGMEN'S ASSOCIATION, an organization of the workingmen of all countries for the advancement of the interests of labor and the emancipation of the working classes. It grew out of a visit of French workingmen to the World's Exposition at London in 1862. In 1864 an organization was formed in London, and an 'Address and Provisional Rules' published; the rules provided for a general congress to be held annually and a central council appointed by that congress to sit in London; workingmen's societies were to join the International in their corporate capacity. The principles and policy were not then definitely announced; the first congress held at Geneva in 1866 passed resolutions favoring the limitation of the working day and the abolishing of child labor; at the next congress at Lausanne (1867) socialistic principles were first definitely announced; from this time the influence of Marx and his followers grew in the organization. In 1868 at the Brussels congress the International announced its opposition to war, and favored the general strike; at the Basel congress in 1869 Bakunin and the anarchists were admitted; but they were expelled from the association in 1872 at the congress at The Hague; this same congress transfered the seat of the General Council to New York. The anarchists held a separate congress at Geneva in 1873. In 1867 the International rendered substantial aid to the strike of the bronze workers in Paris, and the next year to the strike of the Geneva builders; it assisted the English workmen by preventing the importation of underpaid laborers from the Continent in time of strikes. The International was accused of complicity in the Paris Commune, and while the two had no official connection many of the

leaders of the Commune were Internationalists, and its principles and aims were defended by the International. In the United States the Social party, a socialist political organization, was affiliated with the International in 1868, and later some individual trades-unions were also affiliated; finally the North American Federation of the International was formed and held its first national congress in 1872; its organization was in local sections of at least 10 members, with a Federal Council of nine elected by the annual congress. Shortly after the transfer of the General Council to New York the Internationalists took a prominent part in the eight-hour day demonstration in New York. The formal organization of the International was dissolved in 1875; in Europe the Social Democratic parties of the different countries grew out of it, and in the United States the Socialists-Labor party. The anarchist faction in the United States split into two organizations, the International Workingmen's Association and the International Working People's Association. The International was important in the history of the labor movement as being the first expression of the recognition of the common interests of labor in all countries, and as being the means of spreading widely the knowledge of the principles of the Marxian socialism. Consult Brooks, J. G., 'The Social Unrest' (New York 1903), and 'American Syndicalism' (New York 1913); Ely, R. T., 'French and German Socialism' (New York 1883), and 'The Labor Movement in America' (New York, new ed., 1905); Kelly, E., 'Twentieth Century Socialism' (New York 1910).

INTERNODE, in a plant, the portion of the stem between two nodes or leaf-buds; a portion of any elongated body between two nodes or thickenings. See STEM.

INTEROCEANIC SHIP CANAL. See NICARAGUA CANAL; PANAMA CANAL.

INTERPARLIAMENTARY UNION FOR INTERNATIONAL ARBITRATION, an association composed of members or ex-members of the legislatures of the world, formed to promote a peaceful settlement of international disagreements. It was organized at Paris in 1889, but the United States did not send representatives until 1897. In the early 90's its work was so earnest in the interest of international peace and arbitration that an international court was proposed, with jurisdiction in such matters. The Hague Tribunal was the outcome. The later activities of the association have been aimed to secure the adoption between nations of permanent treaties of arbitration. See ARBITRATION; INTERNATIONAL; HAGUE TRIBUNAL, THE.

INTERPELLATION, *in law,* the act of demanding an official explanation of a member of the government, as in France and some other European countries. It is used more frequently in Italy and France than elsewhere. After due notice, any member of the particular legislative body may interpellate the ministry, and this often results in a general debate. Frequently a ministry resigns as a result of an interpellation. The right of permitting or refusing an interpellation rests with the legislative body, not with the ministry. An interpellation is followed usually by a vote of confidence or of want of confidence in the government.

INTERPLEADER, *in law,* a procedure by which a person having goods, money or the like in his possession may have the ownership thereof judicially determined in case of dispute between two or more claimants. Usually such a suit is brought in equity. It is called "multiplepoinding" in Scots law. One seeking this remedy must show that two or more persons claim against him the same thing, obligation, etc.; that he is not in collusion with any of such parties; that he has no beneficial interest in the subject matter of the suit; that he cannot decide without danger of prejudice to his rights who is the rightful claimant, and must show that he is willing to meet his obligation to the lawful owner. Originally this action was restricted to a limited number of cases, but it has been extended so that to-day it may be brought in all claims in which the right or obligation is identical. It is of importance in modern practice, both in Great Britain and in the United States, in the relations involving bailor and bailee, landlord and tenant, common carrier and shipper, tax-collector and landowner, agent or consignee and principal or consignor, sheriff and party claiming goods levied upon, etc.

INTERPOLATION, a word, line, verse, sentence, part of a sentence or whole passage, inserted usually with a view to secure respect for some opinion by the apparent support of antiquity, or of those whose authority is greatest. Many instances of interpolation are well known, and others are with great probability suspected, in which the works of early Christian writers have been tampered with, to make them yield support to novel doctrines and practices. *In mathematics* the operation or method of finding, from a few given terms of a series, other intermediate terms. Interpolation is frequently resorted to in astronomical calculations. Consult Doolittle, C. L., 'Treatise on Political Astronomy as Applied to Geodesy and Navigation' (4th ed., New York 1903).

INTERPRETATION, *in law,* the art of determining the meaning of a speaker or a writer or of the parties to a written instrument, as a contract, deed or the like. Courts of equity, in their interpretation and construction of instruments, follow the same rules as courts of law. The terms interpretation and construction, while frequently used interchangeably by some writers, should be differentiated according to others. In interpretation, they contend, the court decides simply the meaning of words and sentences, whereas in construction the court decides what is their legal effect. Interpretation is merely logical reasoning, while construction is legal reasoning, these writers insist. The two terms, nevertheless, in practice at least, are generally used with identical meaning. The rules for interpretation vary to some extent with the particular class of instrument in dispute. For instance, wills are liberally construed, as the testator is not presumed to know the legal signification of all the terms he employs, but is held to use such in their popular meaning. On the other hand, a deed is generally construed strictly and against the maker when there is ambiguity. A contract must not be strictly nor liberally construed, but the intention must be drawn in the light of surrounding circumstances, as customs of the place or

time, social conditions, etc. Statutes abrogating the common law, as well as penal statutes, must be strictly construed. The same rule is applied to statutes affecting private rights. On the other hand, statutes designed to prevent fraud are liberally construed, and statutes must generally not be construed so as to operate retrospectively.

Some general rules of interpretation are as follows: (1) The meaning of a word, clause or other part of an instrument must be construed in the light of the whole instrument. Such disputed part may have its ordinary meaning entirely changed by this rule. (2) The meaning of the maker of an instrument is to be taken from what is therein contained and also from what may be fairly implied by custom or the like. (3) Due weight must be given to the construction placed upon the instrument by the parties themselves. (4) Words are to be taken in their ordinary meaning unless the writing or the attending circumstances indicate a contrary intention. (5) Where two interpretations are possible, that is to be preferred which is fair and reasonable. (6) Usually ambiguous language is to be construed against the maker of a private writing, as a contract or a deed. (7) When the language of an instrument is clear and unambiguous, interpretation is not needed. In other words, a court will not read into an instrument a meaning it does not express, even if the court does not believe the language expresses the meaning of the maker. (8) As between two interpretations, one of which follows the law and the other does not, the former is to be preferred. (9) A writer cannot be allowed to vary, contradict or add to an instrument by oral evidence to show his actual intention.

In addition to the foregoing list, which is not complete, a large number of special rules have been framed to fit particular cases.

Sometimes the interpretation of an instrument is left to a jury, but the usual rule is that the court decides. For instance, a jury may decide the signification of a written word which has a local or a trade meaning, and similarly a jury may decide the meaning of an oral contract or other oral declaration. In criminal libel cases in the United States, and in all cases of libel and slander in England, the jury likewise decides the meaning of the language employed by the defendant. This forms an important exception to the rule above enumerated.

Interpretation is particularly important in four classes of instruments: deeds, wills, contracts and statutes.

A highly technical classification of different methods of interpretation has been recognized by some authorities, such as liberal, close, restrictive, extravagant, strict, etc., but the first and last are the ones generally used.

An important doctrine, known as that of *cy près*, has been developed in the interpretation or construction of wills and statutes. Under this doctrine so much of the writing will be given effect as is possible. For instance, if an illegal direction is given in a will, so much of the will must be given effect as is legal, if this part is separable, and the remainder ignored. This doctrine is in effect both in Great Britain and in most of the States in this country.

In the interpretation of constitutions, the courts endeavor to harmonize different parts that seem to conflict, and should lean in favor of a construction which will render every word operative, rather than one which may make some idle and nugatory. (8 W. Va. 320). The rule for the construction of Federal and State constitutions is radically different. Consult 102 Tex. 11; 9 Wheat. (U. S.) 1.

INTERRACIAL MARRIAGE. See CROSS-FERTILIZATION IN ANIMALS AND MAN.

INTERSTATE COMMERCE COMMISSION. See COMMERCE, INTERSTATE.

INTERSTATE COMMERCE LAW. See COMMERCE, INTERSTATE.

INTERSTATE COMMERCE LEGISLATION. See COMMERCE, INTERSTATE.

INTERSTATE CONTROVERSIES. See BOUNDARIES OF THE UNITED STATES.

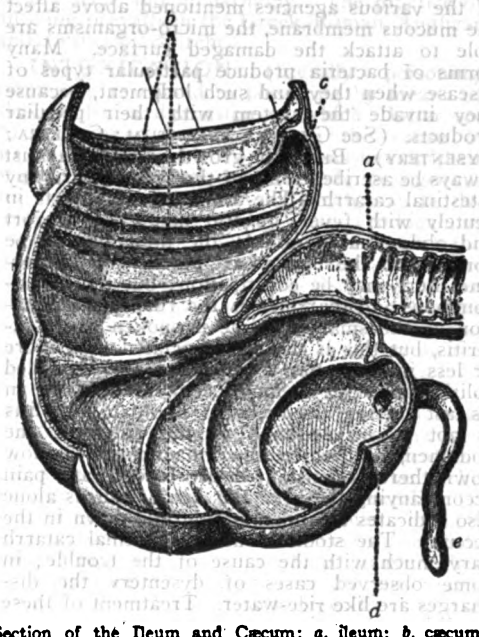
INTERVAL, in music, is the distance or difference of pitch, arithmetically expressed, between any two tones of a given scale. Occidental nations, including America, employ the diatonic scale (see SCALE), an octave comprising five tones and seven semitones, named after the first seven letters of the alphabet. The affix of a flat or sharp before a note denotes its quality but does not affect its name, and the eighth note being in unison commences a new octave. Taking the scale in the key of C major, the various intervals are: minor second = E–F or B–C; grave major second = C–D, F–G, A–B; grave minor third = D–F; minor third = E–G, A–C, B–D; major third = C–E, F–A or G–B; perfect fourth = C–F, D–G, E–A, G–C′, or B–E′; acute fourth = A–D′; acute augmented fourth = B–F; grave diminished fifth = B–F′; grave fifth = D–A; perfect fifth = C–G, E–B, F–C′, G–D′, A–E; minor sixth = E–C′, A–F′, B–G′; major sixth = C–A, D–B, G–E′; acute major sixth = F–D′; grave minor seventh = D–C′, G–F′, B–A′; minor seventh = E–D′, A–G; seventh = C–B, F–C′; octave = C–C′, D–D′, etc. By taking various notes of the diatonic scale as starting points and measuring known intervals from these, we arrive at intermediate notes of the scale, of which the following are examples: C♯ minor third below E; D♯ minor second below E; E♭ minor third above C; A♭ minor sixth above C; B♭ minor seventh above C; B♯ 3 major third above C. The difference of pitch between C and C♯ or between D and D♯ is called a semitone, and an interval increased or diminished by a semitone is said to be augmented or diminished. This applies especially to the interval of a fourth or a fifth, which with the octave are said to be perfect, because any augmentation or diminution mars their consonance. The major sixth or third may, however, be diminished to a "minor" sixth or third without destroying the consonance; and the term "minor" is also applied to the diminished second or seventh. Intervals confined within the octave are simple, when they exceed it compound; the octave beginning a new series, the ninth is the octave of the second, and so forth.

INTERVENTION, in international law, the meddling of one state in the internal affairs of another either for the protection of its own rights or those of its citizens or for some purpose usually humanitarian. It may take place under the form of representations to the Am-

bassador of the country against which it is directed, or that of armed interference. Its essence is illegality and it is only justified by its success. Intervention has been frequently resorted to, especially in Europe during the 19th century, when it often became necessary to secure the balance of power. It is safe to say that armed intervention is not favored except in extreme cases, e.g., the expedition to China during the Boxer Rebellion of 1900. Intervention on humanitarian grounds has at times been resorted to to cover the real object. Interventions under treaty guarantees have not been uncommon. Recent instances of intervention are that of the United States in Cuba in 1898 and England in the Great War because as a signatory to the treaty guaranteeing the independence of Belgium, which was ruthlessly violated by Germany. Consult Moore, J. B., 'Digest of International Law' (1906).

INTESTACY, the legal state of a person dying without having disposed of his property by last will and testament. In Great Britain intestacy does not affect real estate, which is disposed of in accordance with the rule of descent. The effect of intestacy in Great Britain is merely that no directions have been left for the distribution of personal property. The effect of intestacy in the United States varies in accordance with the laws of inheritance fixed by each of them. Intestacy may be complete, as when a valid will is not left by the dead proprietor; or partial, when the extant will only provides for the distribution of part of the property. In these cases the property passes to the heirs or next of kin of the decedent in accordance with the laws of the place where the property is. See DESCENT; HEIR; INHERITANCE.

INTESTINE, BOWEL, or GUT, the alimentary tube, in the higher animals limited to that portion between the stomach and the outlet at the anus. The human intestine is divided into the small and large intestine, the two parts varying in structure, movement and function. The small intestine starts at the pylorus of the stomach, as the duodenum, and the first 8 or 10 inches are so distinguished. This portion is the widest and most deeply placed of the parts of the small intestine. About three or four inches below the pylorus the ducts of the gall-bladder and pancreas open conjointly into the bowel. The duodenum emerges from the cover of the peritoneum and becomes the jejunum. The remainder of the small intestine constitutes the jejunum (about two-fifths) and the ileum. Between these divisions there is little difference, except that the jejunum is more freely movable, occupies the upper left portion of the abdomen more than the lower and right, and has thicker walls. The lumen of the small intestine gradually grows less from the duodenum, where it is two inches and a half in diameter, to little more than an inch where the ileum empties into the large intestine. The ileum is inserted several inches above the actual beginning of the large intestine, so that a blind pouch is formed below the point of juncture; this pouch, called the cæcum, gives off the appendix vermiformis (see APPENDICITIS) from its lower and back part. From the cæcum the large bowel passes up to the under surface of the liver as the ascending colon (see COLON), thence across the abdomen below the lower border of the stomach as the transverse colon, turns down to the iliac fossa as the descending colon, forms a peculiar S-shaped curve, the sigmoid flexure, which passes over the brim of the pelvis, where it is called the rectum (q.v.). The large bowel is about six feet in length. Both bowels have four coats, the mucous coat, the submucous, the muscular, and over most of the bowel an investment of peritoneum forming the serous coat. In the small intestine the mucous membrane is thrown up into permanent folds, each extending over half-way around the inside of the bowel. In this way a large surface is exposed for the absorption of food. Furthermore, the inner surface is covered with finger-like projection called villi, each having a large absorbing vessel in its centre. At the bases of the villi are tubular (of Lieberkuhn) and branching glands (of Brunner) that dip down into the mucous



Section of the Ileum and Cæcum; *a*, ileum; *b*, cæcum; *c*, ileocæcal valve; *d*, opening of the appendix; *e*, appendix.

membrane. Scattered over the surface there are tiny collections of lymphoid tissue, called solitary follicles, and here and there collections of these follicles into groups one to three inches long, called Peyer's patches. It is these spots that are attacked and ulcerated in typhoid fever. The muscular coat consists in an inner layer running around the bowel and an outer longitudinal coat. The large bowel differs from the small in the absence of the folds and villi, and is but slightly movable within the abdomen, being bound down to the abdominal wall posteriorly by the peritoneum. See PHYSIOLOGY.

Diseases of the Intestine.— These may be disturbances of the function of the bowels without actual inflammation, or they may be inflammations in different parts and of different kinds; but with inflammations there is necessarily a disturbance of the various functions, and differentiation frequently becomes a matter of difficulty. Diarrhœa and constipation (qq.v.)

are symptoms of many different conditions, as are also deficiencies of secretion and absorption. The nervous mechanism of the bowels may be changed, giving rise to abnormal sensations and disturbances of all the functions. True inflammation of the intestines is the most common cause of abnormal action, and therefore is described in detail.

Acute Intestinal Catarrh is an inflammation of the mucous membrane that varies much in its symptomatology with the part of the bowel affected and the causative agent. Among the causes may be mentioned the eating of tainted fruits and other foods; the overeating of any food; overdrinking, particularly of very cold liquids; the injection of chemical or mechanical irritants; "catching cold"; and the poisons of the infectious diseases. The bowel is inhabited by numerous forms of micro-organisms, many of which are entirely harmless; but when any of the various agencies mentioned above affect the mucous membrane, the micro-organisms are able to attack the damaged surface. Many forms of bacteria produce particular types of disease when they find such lodgment, because they invade the system with their peculiar products. (See CHOLERA INFANTUM; CHOLERA; DYSENTERY). But to the growth of bacteria must always be ascribed some of the symptoms in any intestinal catarrh. The attack usually starts in acutely with fever, general bodily discomfort and abdominal pain. If the inflammation be confined to the upper part of the small intestine there may be constipation; but this is uncommon, and diarrhœa is the rule. Inflammation of the small intestine is spoken of as enteritis, but this is usually associated with more or less inflammation of the large bowel, called colitis, although it may occur alone even in its last portion, the rectum. The pain in colitis is apt to be confined to the sides of the abdomen, and when the inflammation is low down there is constant desire to defecate, pain accompanying the act. Passage of mucus alone also indicates an inflammation low down in the rectum. The stools in acute intestinal catarrh vary much with the cause of the trouble; in some observed cases of dysentery the discharges are like rice-water. Treatment of these conditions depends upon the severity and location of the inflammation. The mild cases, with ordinary loose movements, recover without medication with abstinence from food for 24 hours. Castor-oil or small doses of calomel will cleanse the intestine of irritating substances. The more severe cases are kept in bed and allowed small amounts of milk after the first day, and are given small doses of castor-oil or mixtures of bismuth, opium and other sedative drugs. If the large intestine is found to be involved, irrigation with common salt in water (teaspoonful to the quart) is valuable. Great care must be used in the selection of diet for some time.

Duodenitis occurs associated with acute gastritis (q.v.), and has the same symptoms, except for the presence of jaundice due to the closure of the bile-ducts. The disease runs its course ordinarily in a few weeks without any treatment except rest in bed for a few days, simple diet and mild cathartics to relieve the constipation.

Chronic Intestinal Catarrh results from a severe attack of acute inflammation in which the mucous membrane is left with permanent changes, or from repeated attacks of inflammation. Cases of chronic inflammation may occur without previous evidence of acute attacks. The symptoms vary much in kind and intensity, but pain, flatulence and disturbance of the bowels are usually complained of. There may be pronounced constipation, alternating constipation and diarrhœa, daily unformed movements not distinctly diarrhœal, or, what is most common, a constant diarrhœa. More or less admixture of mucus in the stools is usually observed. Sooner or later there is apt to be a loss of flesh and strength. When the large bowel is much involved in such a process there is usually a coating of the stools with mucus, or the passage of clear mucus.

In the treatment it is best to rely mainly on carefully regulated life — exercise, baths, fresh air, sufficient rest, avoidance of exposure and properly selected diet. In diet, the objects sought are the regulation of the bowels and the avoidance of irritation. When there is diarrhœa it is wise to avoid fruits, salads, cabbage, coarse-fibred breads, sugars, honey, pastry, sour and sweet wines and carbonic beverages. In cases attended with constipation most of these may be allowed, but sausages, rich dressings, cucumbers, cabbage and very coarse-fibre breads should be forbidden. Mineral waters are frequently used with success, such springs as Carlsbad and Vichy for the diarrhœal cases, and such as Marienbad, Hathorn and Congress for those attended with constipation. Chronic catarrh of the large bowel is treated with small doses of castor-oil and irrigations of the bowel with water, to which may be added antiseptics or astringents.

Intestinal Hemorrhage, or blood passed from the bowel, may be due to piles, tumors, dysentery, colitis, typhoid fever, tuberculosis of the intestinal tract, ulcers of the duodenum, portal obstruction as in cirrhosis of the liver, hemophilia, purpura and the hemorrhagic forms of the infectious diseases. When blood coming from the stomach or high up in the small intestine is passed by rectum it is changed to a tarry appearance This is due to the action of the digestive juices and bacteria. The farther down the intestine the blood starts, the brighter red is it found when passed.

Intestinal Obstruction is a term that includes a great variety of conditions in the abdomen having the common feature of obstruction to the passage of the contents along the bowel; and in addition there is in the acute condition some injury to the bowel resulting in special symptoms. Two varieties are differentiated, the acute and the chronic. Acute intestinal obstructions are caused by foreign bodies, gall-stones and hardened or large collections of fæces in the canal; by contracting scars, or tumors of the wall, twists of the gut (volvulus), intussusceptions (invagination of a portion above into the part below); by adhesions of the peritoneum, causing constricting bands; and by strangulations of portions of the bowel contained in hernia. Besides these causes, from a local or general peritonitis there is apt to be a condition of paralysis of a portion of the bowel, giving rise to the same state. The symptoms vary considerably with the cause of the obstruction and the part of the bowel affected, but in general the symptoms are pain — first

quently of a colicky sort — constipation, inability to pass gas — with resulting tympanites — vomiting, first from the shock, and later from reversed peristalsis, until at length the vomitus is bilious and finally even fæcal. Because of these symptoms and the injury to the nerves of the intestine resulting in "shock," there is a gradually increasing prostration. Certain features indicating that the obstruction is in the small intestine are early vomiting, the passage of fæces from the lower bowel and the greater swelling of the centre of the abdomen. Absolute constipation from the first is apt to mean an obstruction low down in the large bowel. The cause of the obstruction may be indicated by the presence of a tumor, or by something in the previous history. Intussusception is the most common cause of the obstruction in children; a tumor may be felt on the outside, or the bowel may be felt in the rectum. Fæcal impaction is indicated by a long history of constipation, and rectal examination shows the hardened masses. If intestinal obstruction be not relieved, the patient may die of shock, with gradual exhaustion, from gangrene of the bowel — the blood-supply being usually shut off — and sometimes from peritonitis.

Medical measures for the relief of most forms of the malady are not successful, and temporizing is attended with danger; but rest of the body as a whole and especially of the intestinal tract must be absolute. Some authorities advise the use of opium for further quieting the intestine when the diagnosis is certain. Lavage of the stomach is of great value, and large enemata may be curative when the cause of the trouble is intussusception, foreign body or hardened fæces. Most forms of obstruction require the opening of the abdomen, search for the cause of the obstruction, and attempts at removal. Results depend on the quickness with which operation is undertaken; death may ensue, in spite of the removal of the obstruction, if interference be too long postponed. Chronic intestinal obstruction is caused by about the same conditions as the acute variety The symptoms include various digestive disturbances, flatulency, constipation, and, when due to malignant growths, the general loss of flesh and strength

Intestinal Parasites.— Three principal forms of these affect man — tapeworms, roundworms and pinworms (qq.v.). The list of symptoms attributed to the presence of tapeworms in the human intestine is long and varied, but even loss of nutrition from such a parasite's presence is usually slight. Finding the worms or their eggs in the stools is the only convincing symptom. Treatment of this condition consists first in the preparation of the intestine by light diet for 24 hours before the tænifuge is given and six or eight hours before, allowing a liberal diet of onions, salty herring and garlic; this rather loosens the worm's hold. Mild purgatives may also be given at this time. Early on the following morning the selected drug is taken, and this may be either male-fern, pomegranate, pumpkin-seed, kousso or kamala. After about 12 hours a brisk cathartic is taken and the worm is passed. Careful search must be made for the head, for unless it is passed treatment must be started again while the worm is yet weak. Santonin and purgatives effect expulsion of roundworms. In the treatment of pinworms it is customary to take advantage of the fact that the females deposit their eggs in the large intestine and rectum. Santonin and cathartics aid in gathering the worms where they may be killed by injections of benzine (20 drops to the pint of water), or by solutions of quinine, though further catharsis may be necessary.

INTIMIDATION. See CORRUPT PRACTICES ACTS.

INTONING, the practice of delivering prayers in the recitative form. Intoning differs little from chanting: in the latter case the cadence is more developed, the divisions more rhythmical and the music in continuous harmony. In intoning the greater part of the prayer is recited on one note and then sung by several voices in unison, the closing words of the sentence being sung to the proximate notes of the scale and in harmony. The practice of intoning prevails in the Greek, Roman, Anglican and Lutheran churches.

INTOXICATION (literally poisoning, commonly restricted to poisoning by means of alcohol, for a discussion of which latter see ALCOHOLISM). Intoxication in the sense of poisoning may result from poisons having their origin outside of the human body (exogenous poisoning), or from poisons which may be developed within the body itself (endogenous poisoning, or auto-intoxication). Some of the most important problems connected with the infectious diseases concern themselves with the study of the intoxications that result from the formation of toxins by specific bacteria distributed throughout the human body during the course of a disease. From the same point of view many of the most complicated intoxications result from variations in the normal metabolism of the body. Thus in diabetes mellitus (q.v.) there is developed an acid intoxication (diabetic coma), which is due to the inability of the body properly to neutralize by its alkaline salts the excessive amounts of acid produced as a result of the perverted metabolism of this disease. Similarly in Bright's disease a type of intoxication (uræmic poisoning) results from failure of the kidneys to eliminate poisonous products from the human body. It seems not unlikely that a number of diseases such as migraine (sick headache), some forms of epileptic convulsions, different types of skin-eruptions and some of the mild insanities result from auto-intoxication (q.v.). See TOXICOLOGY.

INTRA, Italy, town of Piedmont, province of Novara, on the western shore of Lake Maggiore, 12 miles north of Arona. It has good water-power facilities which are utilized by its cotton and silk mills, foundries, hat factories, leather works, etc. Its industries are largely the property of the Swiss who inhabit splendid villas along the lake front. Pop. 8,000.

INTRANSIGENTES, or **INTRANSIGEANTS,** in France, Spain and Italy, extreme radical republicans; the party of irreconcilables. In Spain the Intransigentes combined with the Internationals in an extreme communistic movement of insurrection in 1873 against the federal republic.

INTRENCHMENT, in fortification, any work, consisting of not less than a parapet

and a ditch, which fortifies a post against the attack of an enemy. As a means of prolonging the defense in a regular work of permanent fortification, intrenchments are made in various parts, to which the defenders successively retire when driven in from forward works. Bastions are ordinarily intrenched at the gorge by a breastwork and ditch, forming either a recentering angle or a small front of fortification. An army in the field often strengthens its position by intrenchments, as by a continual line of parapet and ditch, or by a line with intervals, consisting of detached works of more or less pretension flanking each other. The war in Europe, which began in 1914, was marked by an unprecedented system of intrenchment, with shelters, dug-outs, barbed wire obstacles, etc. See FORTIFICATION; WAR, EUROPEAN.

INTRODUCED SPECIES. A long catalogue might be made of species of animals and plants which have been transferred by accident or design from their native country or locality to other regions. Sometimes, as in the case of salmon in New Zealand, rabbits in Australia, the European house-sparrow in America and elsewhere, or Western fishes in Eastern waters, this is done by design; but in the great majority of cases the introduction is accidental and unwelcome, as in the case of the hundred and more species of injurious insects brought into the United States from foreign lands (or the fewer sent abroad from here), and the very many species of "weeds" naturalized on our and other shores. Such introductions are in the main accidental, the eggs or seeds or grown individuals passing from one region to another in ships or railway trains, or cargoes or discharged ballast; so many plants have been introduced by the latter means that botanists class the group of alien weeds as "ballast plants." See ACCLIMATIZATION; IMMIGRATION, ANIMAL AND VEGETAL.

INTROSPECTION, observation as applied to the phenomena of mind. While in essentials it is like all other observation, it is especially interesting because of certain difficulties which it encounters. Though these have been minimized by the experimental psychologist, they certainly burden psychological research with a very considerably greater degree of fallibility than that found within the natural sciences. As was pointed out by Kant, the chief obstacle to introspection is the fact that the phenomena forming the object of introspection are liable to profound modification by the act of introspection itself. It is indeed by no means inconceivable that objects within the mind may be as unmodified by the observation of an independent part of consciousness as non-mental objects. The difference between observation and introspection is thus in a sense merely one of degree; none the less it is not negligible. The crude introspection of common sense — which furnishes the only possible starting point for the refined introspection of experimental psychology — indicates to us that experiences are actually changed by a change in the direction of our attention. If one thinks intensely of the tip of his forefinger he will experience pressure sensations, temperature sensations, etc., which seem different from the casually remembered sensations experienced with a different direction of attention. If he listens to a particular instrument in an orchestra he will hear it as distinctly louder than if he listens to the orchestra as a whole. Now while the experiences which form the basis of our observation of nature are subect to change by our change of attention, in a manner not unlike our introspection, there is a fundamental distinction between the two cases. This distinction resides in the fact that whereas the apparatus of physical research reduces the experiences and phrases of experience involved to those which by their simplicity are not subject to much alteration by a change in the attention, all the instruments of the psychological laboratory cannot reduce by one iota the complexity and multability of the objects of introspection, for these constitute the entire content of the mind. Before this content can be studied by fragments with the aid of the apparatus of the psychological laboratory, it must be demonstrated by introspection that these fragments are really fragments of the more complex experiences. Introspection, therefore, can never free itself from a subject matter that changes with the direction of the attention by a mere choice of its objects. Now, introspection is itself a change of attention from the natural object of the experience to the experience itself. By its very nature, then, it may be expected to induce profound modifications in its objects. In order to avoid this, the psychologist trains himself to make introspection a more or less automatic act, requiring a relatively slight diversion of attention. While this is unquestionably the only method to gather a large mass of introspective data with relatively slight modifications by the method by which they are recorded, it is subject to grave dangers of its own. A prolonged training in laboratory introspection is likely to give one a somewhat narrow repertory of introspective terms borrowed largely from the senses of vision and hearing, and possibly inadequate to the tasks of introspection which are likely to be undertaken. The schematization of the process of introspection may well be inseparable from a schematization of its dicta. That mental phenomenon known as suggestibility makes it scarcely a matter of doubt that in many cases the introspection of one trained in the methods and doctrines of some special psychological school will contain artifacts, not present in the actual mental occurrences.

Besides the difficulties dependent on the attention and on suggestion, another obstacle to introspection is the privacy and inaccessibility of every experience. While no single observation in physical research can be repeated as such, or shared by several observers, the observation of several experimenters with respect to a given occurrence possess a certain equal weight and direct comparability, while the history of physics shows that it is possible to repeat many an experiment in practically all its significant details. While psychological experiments can be repeated, and many times with valuable results, as soon as the more complex processes — and particularly those of affection — are involved, the variation in the mental content and background from time to time becomes an obstacle that can only partially be circumvented. Physical experiments in heat and electricity can only be repeated by virtue of the existence of thermal and electric insulators.

Chemical experiments demand apparatus that is inert to the reagents. Now, there is no thoroughly satisfactory way of insulating an experience of any degree of complexity from its mental background, nor of enclosing it, as it were, in an inert container. Thus it is difficult to repeat an introspective situation in such a manner as to duplicate all the features which are important from a given standpoint. The impossibility of sharing an introspection needs no comment. It has been said that every introspection is retrospection. This is true in a sense, for manifestly no complete view can be taken of a time-consuming experience — and all experiences, as far as we know, consume time — until the beginning of it is in the past. However, the knowledge of an occurrence in the immediate past need not be a matter of memory, for it appears that the direct cognitive relation can bridge brief intervals of time. This direct nature of immediate retrospection permits the psychologist to make many valuable introspections on chance states, the excitation of which in the laboratory would be difficult or impossible. The result of the foregoing discussion, then, is: Introspection is the fundamental method of psychology and is a valid type of observation but is subject to certain grave and peculiar difficulties which are at any rate less apparent in other types of observation. These are in part alleviated, in part aggravated, by the methods and practices of the psychological laboratory. These methods and practices have at best a limited scope and cannot be said to have supplanted the older method of introspection upon the psychological phenomena of daily life. (See PSYCHOLOGY). Consult James, W., 'Principles of Psychology' (New York 1899); Klemm, O., 'History of Psychology' (ib. 1914); Kulpe, O., 'Outlines of Psychology' (tr., ib. 1901); Titchener, G. B., 'Text-Book of Psychology' (ib. 1910); Wundt, 'Essays' (Leipzig 1906).

INTRUSION. See VOLCANISM, and section on *Volcanism* in article on GEOLOGY.

INTUBATION, the introduction of a tube into an orifice or an organ, as the larynx, to keep it open. Specially designed tubes for such a purpose are sometimes used in cases of croup, diphtheritic obstruction, etc., as a substitute for tracheotomy.

INTUITION, *in philosophy,* immediate knowledge, attained without deliberation or reasoning, as opposed to empirical knowledge which is built up by experience. The term has wide use in connection with intuitional systems of ethics which set forth conscience as a function which gives direct recognition of right and wrong, either in a choice between two acts, or between two principles of action. In the theory of knowledge intuition is the immediate apprehension of truth, whether that be sensory truth or necessary forms of thought, or ultimate knowledge of the nature of God, etc.

INTUITIONISM, a term used to designate loosely a wide range of philosophic theories in metaphysics, ethics and æsthetics, among which the common feature is an insistence upon the existence of direct, immediate apprehension of truth, beauty or right, without any necessary dependence upon experience. In general such philosophic tendencies are set over against empirical theories. The latter have generally carried the day in modern philosophy; in so far at least as concerns the recognized necessity for the action of experience in order to give solid foundation for belief, opinion and theory of every kind. In modern literature the term has its most important bearing in ethical affairs. See EMPIRICISM; EPISTEMOLOGY.

INTUSSUSCEPTION, the reception of one part within another, as of a sword in a sheath; as applied to the bowels, it expresses the slipping of one portion of the intestines into and constriction of another. It is a rather common form of intestinal obstruction, especially in infants, among whom over 25 per cent of all cases occur. It is fatal unless removed by surgical operation. In plant physiology, the term signifies the growth of a cell-wall by taking up new matter throughout, instead of laying it on by opposition.

INULIN, a substance resembling starch, but intermediate in nature between that body and the gums. It occurs in the roots of elecampane, dandelion and certain other plants, and also in the Jerusalem artichoke and the common potato. When pure it is a tasteless white powder consisting of spherical particles. Its chemical formula is probably a multiple of $C_6H_{10}O_5$, though $C_{12}H_{18}O_{09}$ has been suggested. It is insoluble in alcohol and but slightly soluble in cold water, although it is very hygroscopic. It dissolves freely in hot water. It melts at 320° F., becoming thereby converted into a different substance known as "pyro-inulin." It is not fermentable and does not reduce Fehling's solution. Iodine renders it brown or yellow.

INUNDATIONS, floods caused usually by the overflow of a river or by the ocean, sometimes by the giving way of a dam or other barrier. Since the dawn of history no century and scarcely any large country have been free from floods. The region of the Nile in Egypt, and of the Hoang-Ho, or Yellow River, in China, have suffered most from this cause; and the Nile stands alone as at once a terribly destructive and a beneficial agent, for its overflows have not only irrigated the surrounding dry country, but greatly enriched it by spreading over it the fertilizing sediment collected and conveyed in the stream. In recent years sanitary science has greatly reduced the danger of pestilence that always follows a great flood, and that formerly was often as destructive of human life as the floods themselves.

The following are some of the most noted inundations of record: 245, the sea swept over Lincolnshire, England, and submerged thousands of acres; 353, a flood in Cheshire, England, destroyed 3,000 lives and a great number of cattle; 738, an overflow of the Clyde drowned 400 families in Glasgow; 1014, a number of seaport towns in England and the Netherlands were destroyed; 1100, the coast of Kent, England, was deluged and the Goodwin Sands bank formed by the sea; 1108, Flanders was submerged by the sea and the town and harbor of Ostend completely covered; 1134, a large part of Flanders was again submerged; 1164, a considerable part of the coast of Friesland was swallowed up; 1170, many miles of country in the northern part of Holland were engulfed with great loss of life; 1219, the break-

ing of the dykes along the Zuyder Zee caused great destruction of life and property; 1277, 44 villages in Holland were destroyed; 1282, 72 towns and villages in Holland were submerged and 100,000 persons drowned; 1287, another breaking of the dykes caused a loss of 80,000 lives; 1362, 30 villages on the coast of Nordstrand were destroyed; 1377, 50 miles of territory and 72 villages in Holland were swept away and the course of the Maas and Rhine rivers changed; 1421, by the breaking of the dyke at Dort 10,000 people in the town and 100,000 in the vicinity were drowned; 1530, a general failure of the dykes caused an overflow of the low lands and a loss of life estimated at 400,000, and of property in proportion; 1570, Antwerp, Bruges, Hamburg, Rotterdam and Amsterdam were submerged and 30,000 inhabitants drowned; 1617, 50,000 persons were drowned in a flood in Catalonia, Spain; 1634, a flood swept away several villages on the Nordland coast of Denmark, and drowned 11,000 people and 66,300 cattle and 10,800 people and 90,000 cattle were drowned at Hamburg, Bremen and Oldenburg; 1717, the "Christmas" flood along the entire north coast and in England totally destroyed 5,000 dwellings, and 3,500 partially; 1787, mountain torrents drowned 2,000 persons in Navarre, France; 1811, 24 villages near Presburg and nearly all their inhabitants were swept away by an overflow of the Danube; 1813, large provinces of Austria and Poland were flooded and many lives lost (6,000 in Silesia, and 4,000 in Poland), and 2,000 Turkish soldiers on an island near Widdin were drowned by a sudden overflow of the Danube 1816, the overflow of the Vistula River laid 119 German villages under water, and caused great loss of life and property; 1829, the same river broke through the dyke at Dantzig, drowned a large number of people and destroyed 4,000 dwellings and 10,000 cattle; 1830, an overflow of the Danube at Vienna flooded the homes of 50,000 inhabitants; 1833, 10,000 horses were swept away, and 1,000 persons drowned in Canton alone during the great October flood; 1840, a rising of the Saone river, France, and the bursting of its banks, caused 60,000 acres to be submerged and many houses destroyed in Lyons, Avignon, La Guillotière, Voise, Marseilles and Nismes; 1846, by the Loire flooding the centre and southwest of France, $20,000,000 damage was sustained; 1849, 160 squares and 1,600 buildings were flooded in New Orleans; 1852, the Hoang-Ho, in China, burst its banks, cut a new bed into the Gulf of Pechili and wrought tremendous losses; 1855, Hamburg was half submerged and suffered enormous property damage; 1861, Bengal, India, suffered great loss of life and property by a deluge in its most fertile districts, and famine and pestilence followed; 1866, the north of England was visited extensively by floods; 1870, Rome, Italy, suffered great loss; 1874, the bursting of a badly constructed dam caused the destruction of several villages in the valley of Mill River, Mass., and loss of 144 lives; 1876, destructive flood occurred in France and Holland; 1882, many persons were drowned and much property destroyed by overflows in the Mississippi and Ohio valleys; 1887, the Hoang-Ho, China, broke its banks, deserted its natural bed, spread over a thickly populated plain, cut an entirely new road to the sea, washed away 300 villages, and submerged the lands around 300 more between Cheng-Chou and Chung-mon, submerged more than 1,500 villages south of Kaifeng, rendered 2,000,000 people homeless and caused a loss of life estimated from 1,500,000 to 7,000,000; 1889 (31 May), the giving way of the Stony Creek dam in the Conemaugh Valley, Pa., caused the total destruction of the city of Johnstown and several neighboring towns, and caused a loss of about 5,000 lives and more than $20,000,000 of property. The same year was marked by very disastrous floods in China and Japan. In 1890, the levees of the Mississippi gave way in many places, and the waters flooded large areas of land in Mississippi and Louisiana. The worst crevasse was caused by the giving way of the Morgansea, near Bayou Sara. In 1903 there was a great rising of the Kansas, Missouri, Mississippi and Des Moines rivers; several large cities, including Kansas City, Des Moines and Topeka, were inundated, the loss of life was over 300, and of property about $10,000,000. In the same year Paterson, N. J., and the entire Passaic Valley were flooded, about $3,000,000 damage being done in Paterson. In 1912 the Mississippi inundated 15,000 square miles with a damage to property estimated at $45,000,000. In March–April 1913 a most destructive flood occurred in the Ohio Valley, due to an excessive rainfall within a short period, 400 lives were lost and the damage to property reached $180,000,000. The city of Dayton was almost destroyed. Consult Stoney, 'Extraordinary Floods in Southern India' (London 1898); Williams, 'Effects of Land Floods in a Tidal River' (London 1891); Vallès, 'Etudes sur les inondations, leurs causes et leurs effets' (Paris 1857); Mississippi River Commission 'Reports.'

INVALIDES, Hôtel des, an establishment in Paris where wounded veterans of France are cared for at the public cost. Its foundation dates from 1671, under Louis XIV; at first it was a place of retirement for the aged servants of court favorites as well as for invalided soldiers, but this abuse was ended by St. Germain in the reign of Louis XV. With its high gilded dome, under which are the tombs of Napoleon, Turenne, Vauban, Jerome and Joseph Bonaparte, and Marshal MacMahon, it is one of the most conspicuous monuments of Paris. The buildings, which cover about 30 acres, were begun in 1671 and completed in 1675. They furnish accommodation for 6,000 inmates. The façade of this last structure is 660 feet in length. It stands about 600 yards back from the Seine, facing the Esplanade des Invalides, a fine open place about 900 feet wide, containing several rows of trees and extending to the river opposite the Champs Elysées. In 1789 the private property of the institution was alienated and it has since been supported from the public revenue. The body of Napoleon rests in the crypt of the dome.

INVAR, an alloy of nickel and steel with exceedingly small coefficient of heat expansion, only one-twenty-fifth that of steel. It is used for measuring-rods in geodetic work, for pendulums and other purposes where liability to heat expansion vitiates accurate work. It contains 36 per cent of nickel. The name is a condensation of the word invariable. See CLOCK and GEODESY.

INVARIANTS AND COVARIANTS.

1. These terms were introduced and are still ordinarily employed, in connection with a special mathematical theory, namely, the theory of the linear transformation of algebraic forms developed by Cayley and Sylvester during the middle third of the 19th century. The central idea, however, is a very general one, which has been applied in recent years to almost all branches of mathematics. It deserves, in fact, to be ranked with such fundamental concepts as function and group. We therefore divide our sketch into three parts as follows: (1) The general concept of invariant; (2) the theory of algebraic forms, or invariants in the narrow sense; (3) other invariant theories.

The General Concept.

2. The suggestion for the formation of the concept comes from the familiar observation, at the bottom of all science and philosophy, that, while the world about us is in a continual state of change, there are yet certain aspects or properties which are unaltered. To find the permanent in the changing is the most general statement of the problem of invariants. Abstractly, the idea may be explained more definitely as follows: Consider a set of objects or elements O of any conceivable kind, finite or infinite in number; and a set of operations or transformations T, each of which interchanges the objects in a definite manner. Then a property of an object O is said to be *invariant*, provided it holds for all the objects obtained from the given O by the transformations T. Similarly, any relation between a number of O's which holds for the transformed O's is said to be an invariant relation, that is, an invariant relation of the given objects with respect to the given transformation.

The idea of *covariant* involves nothing essentially new. An object $\bar{O}$ is said to be a covariant of a given number of objects O_1, O_2, etc., provided $\bar{O}$ is invariantly related to O_1, O_2, ... In this case, if any one of the transformations T converts $\bar{O}$ into $\bar{O}'$, O_1 into O_1', O_2 into O_2', etc., then the relations connecting $\bar{O}'$ with O_1', O_2', etc., are the same as those connecting $\bar{O}$ with O_1, O_2, etc.

3. The idea is best illustrated by examples from geometry. Consider a number of points P_1, P_2, ..., connected with a solid body. When the body is displaced, its points take new positions, P_1', P_2', ... Many such positions are possible, since the displacement may be made in an endless number of ways. But in every case, of course, the distance between P_1' and P_2' is the same as that between P_1 and P_2. That is, distances between points are invariant with respect to rigid displacement.

Suppose next that the solid carrying the points is not only displaced but is magnified (or diminished) according to any scale. (We may, for example, picture such a change as produced by subjecting the homogeneous solid to a higher or lower temperature). The solid is then converted into one of different size but of the same shape, that is, a similar solid. Distances are changed in the same ratio. Hence $P_1'P_2'/P_3'P_4' = P_1P_2/P_3P_4$. That is, the ratio of any two distances is invariant with respect to similitude transformations.

4. In both examples, points on a straight line are converted into points on a straight line. Collinearity is then a relation which is invariant with respect to displacements and similitude transformations. A more general type of transformation for which this is true is the homographic or projective transformation. We consider, for simplicity, only the case of figures drawn in a plane M. From a fixed point (termed the centre of projection) outside of M draw lines to the various points of M until they intersect a second plane M'. Thus, every point P in M is associated with a definite point P' in M'. The operation of passing from a figure in M to the corresponding figure in M' is termed projection. Concretely, we may think of the centre of projection as a source of light and the figure in M' as the shadow of that in M.*

If we consider three points P_1, P_2, P_3 on a straight line in M, they are converted, by projection, into points P_1', P_2', P_3' on a straight line in M'. But in general the distances and also the ratios of distances will differ. In fact, three points have no invariant, since they may be converted into three points at arbitrarily assigned distances by a suitable projection. If, however, we take four points (on a straight line) it may be shown that, for any projection,

$$\frac{P_1P_3}{P_3P_2} : \frac{P_1P_4}{P_4P_2} = \frac{P_1'P_3'}{P_3'P_2'} : \frac{P_1'P_4'}{P_4'P_2'}.$$

In each member of this equation we have a combination of the distances between four points which is termed their cross ratio (anharmonic ratio). Hence the cross ratio of four collinear points is invariant with respect to projective transformation.

5. Let the figures considered be all the ellipses of a plane. With respect to displacement an ellipse has two invariants, the major and the minor axis. With respect to similitude transformation, there is one invariant, the ratio of the axes, or what is essentially the same, the eccentricity. Finally, in the projective theory there are no invariants, since one ellipse may be converted into any other (and even into any proper conic).

In this connection we may illustrate the notion of a covariant. The centre of an ellipse is a covariant with respect to displacement and magnification, but not with respect to projection. For if the plane containing an ellipse E and its centre C is displaced or magnified, so that ellipse E is converted into another ellipse E' and the point C is converted into a point C', then C' is necessarily the centre of E'; while under projection this is not the case. A similar result holds for the centre of gravity of any figure, plane or solid.

6. Another well-known type of transformation is that known as inversion. Take a fixed circle F with centre C and radius r, and suppose that any point P of the plane is converted into the point P' situated on the line CP, so that $CP \cdot CP' = r^2$. The points P, P' are then said to be inverse with respect to the circle F. By the inverse of a curve is meant the locus of the points inverse to the points of the curve. The collinear relation of points is no longer invariant, for a straight line (not passing through C) is converted into a circle. An arbitrary

* It is however necessary to include the ideal shadow formed by producing the rays away from M.

circle is converted into a circle, but the centre of the circle is not a covariant point. The most important property of the transformation is this: the angle at which any two curves intersect is equal to the angle at which the inverse curves intersect. Angles are invariant with respect to geometric inversion.

7. We pass now to a few simple examples of the general definition in No. 2, in which the objects and transformations are analytic instead of geometric.

Let the objects O be functions of any number of variables, and let the operations T performed on these functions be the permutation of the variables involved. A function written down at random, for example $x^3 + 2yz$, changes its form when say x and y are interchanged. There are exceptional functions, like $x^2+y^2+z^2$ and $xy+yz+xz$, which are not altered by interchanging the variables in any way, and are termed symmetric. The symmetric functions are invariant with respect to permutation of the variables.

In the differential calculus it is shown that the exponential function e^x has the property of being its own derivative. The only functions which are invariant with respect to the process of differentiation are in fact those of the form ae^x, where a is a constant. It is obvious that if the first derivative is equal to the original function, all the higher derivatives will also be equal to the function.

The trigonometric functions have a period of 2π or 360°. Such a function $f(x)$ is unaltered in value when x is replaced by $x+2\pi$. It is obvious that the double application of the operation, that is, the replacing of x by $x+4\pi$, will also leave $f(x)$ invariant. The periodic character thus involves the invariance of the function with respect to all the operations $(x, x+2k\pi)$ (this denotes the replacing of x by $x+2k\pi$), where k is any integer. We note here that if one of these operations, say that of adding $2k'\pi$ to the angle, is followed by another, say that of adding $2k''\pi$, the result is the same as the single operation of adding $2(k'+k'')\pi$, which is a member of the set. The set of operations thus possesses the essential property of a group.

8. In general, if an invariant is found with respect to certain operations, T_1, T_2, ..., the invariance also holds for all combinations of these operations. Adding these combinations to the original operations, a set is finally obtained with the group property; this is then termed the group generated by the given operations.

Thus, in connection with No. 6, since angles are unaltered by inversion with respect to any circle, it follows that they are unaltered by successive inversion with respect to a number of circles. The inversions themselves do not constitute a group; but the totality of combinations is the important group of circular transformations which are expressed analytically by the linear transformations of a complex variable and of its conjugate.

9. The general problem of the mathematical theory of invariants may now be restated as follows: Given any group of transformations, and any set of configurations (mathematical objects) which are converted into one another by these transformations, to find the properties of the configurations which remain unaltered. There are thus as many types of invariant theories as there are types of groups and types of configurations. The distinction according to groups is the more fundamental.

10. The relation between the concepts invariant and group is thus very intimate. Suppose that instead of assigning transformations and seeking invariants, the question is inverted: Given a property or a function, find the transformations which leave it invariant.

Thus, if space is to be deformed so as to leave the distance between every pair of points unaltered, the deformation must be simply a displacement. The totality of displacements forms a group; for if one displacement is followed by a second, the effect is the same as that due to a single displacement. In general the totality of transformations defined by one or more invariants is a group. Many groups are defined in this way.

11. In connection with any group this question may be asked: Given two configurations, is it possible to convert the one into the other by a transformation belonging to the assigned group? If this is the case, the configurations are said to be *equivalent* with respect to the group.

Thus, two figures are equivalent with respect to the displacement group when they are congruent; they are equivalent with respect to the similitude group when they are similar. The study of equivalence with respect to the projective group is the main object of projective geometry; its systematic analytic treatment depends upon the theory of algebraic forms considered below.

The importance of the notion of equivalence depends upon the fact that equivalent configurations necessarily have the same invariant functions and properties. Thus in studying the projective properties of (proper) conics, it is sufficient to consider the case of a circle. The circle may thus be taken as the *type* or *canonical form* of the class of conics.

The Theory of Algebraic Forms.

12. This part of modern algebra deals with the invariants of algebraic forms with respect to the group of linear transformations. It has been variously termed the theory of forms, the algebra of quantics, the algebra of linear transformations, the linear or projective invariant theory. Traces of the idea may be found in papers by Lagrange, Gauss and Cauchy; and simple results on quadric forms were given by G. Boole (1841); but the construction of the systematic theory begins with the memoirs of A. Cayley (1845–) and J. J. Sylvester* (1851–). The recent developments are due mainly to German and Italian mathematicians.

13. The objects considered are algebraic forms. A *form* or *quantic* is a rational integral homogeneous function of any number of variables. Forms are classified according to the number of variables and the degree in which they are involved. A *binary* form involves two variables; a *ternary*, three; a *quaternary*, four; in the general case of p variables the adjective p-ary is employed. The degree in which the variables enter is termed the *order* of the form;

* Most of the technical terms employed (including invariant, covariant, form) are due to Sylvester, who gloried in the title of "The Mathematical Adam."

we denote it in general by n. If n is one, the form is linear; if two, quadric (or quadratic); if three, cubic; if four, quartic (biquadratic); etc.

Thus the binary cubic form is

$$ax^3+bx^2y+cxy^2+dy^3,$$

where x, y are the variables and a, b, c, d the coefficients. It is usual, however, to distinguish the variables and the coefficients by subscripts, a notation which has the advantage of generality and symmetry; also binomial coefficients are introduced. Thus the above form is written

$$a_0x_1^3+3a_1x_1^2x_2+3a_2x_1x_2^2+a_3x_2^3.$$

The ternary quadric is

$$a_{11}x_1^2+a_{22}x_2^2+a_{33}x_3^2+2a_{23}x_2x_3+2a_{13}x_1x_3+2a_{12}x_1x_2.$$

The general binary form is

$$(1)\quad a_0x_1^n+\frac{n}{1}a_1x_1^{n-1}x_2 + \frac{n(n-1)}{1\cdot 2}a_2x_1^{n-2}x_2^2+\ldots+a_nx_2^n.$$

14. The group employed consists of the totality of linear transformations of the variables. A linear transformation from the original variables $x_1, x_2, \ldots x$ to the new variables $X_1, X_2, \ldots X_p$ is defined by p equations of the first degree, as follows:

$$\begin{aligned} x_1&=l_{11}X_1+l_{12}X_2+\ldots+l_{1p}X_p,\\ x_2&=l_{21}X_1+l_{22}X_2+\ldots+l_{2p}X_p,\\ &\ldots\ldots\ldots\ldots\ldots\ldots\\ x_p&=l_{p1}X_1+l_{p2}X_2+\ldots+l_{pp}X_p. \end{aligned}$$

The determinant

$$\Delta=|l_{ij}|,$$

whose elements are the p^2 coefficients in these equations, is termed the *modulus* of the transformation. It is assumed that Δ does not vanish; for in the latter case the X's cannot be expressed in terms of the x's, that is, the transformation is not reversible.

We shall deal mainly with binary variables and then employ the simpler notation

$$(2)\quad x_1=l_1X_1+m_1X_2,\quad x_2=l_2X_1+m_2x_2.$$

The modulus is $\Delta=l_1m_2-l_2m_1$.

15. When a linear transformation is carried out on a form, the latter is converted into a form of the same order containing the new variables. The coefficients of this transformed quantic depend of course upon the transformation employed. Thus if in the quadric

$$f\equiv a_0x_1^2+2a_1x_1x_2+a_2x_2^2$$

we make the substitution (2), the result is a new quadric,

$$F\equiv A_0X_1^2+2A_1X_1X_2+A_2X_2^2,$$

where

$$\begin{aligned} A_0&=l_1^2a_0+2l_1l_2a_1+l_2^2a_2,\\ A_1&=l_1m_1a_0+(l_1m_2+l_2m_1)a_1+l_2m_2a_2,\\ A_2&=m_1^2a_0+2m_1m_2a_1+m_2^2a_2. \end{aligned}$$

It is easy to verify that

$$A_0A_2-A_1^2=(l_1m_2-l_2m_1)^2(a_0a_2-a_1^2).$$

According to the general definition in No. 2, the function $a_0a_2-a_1^2$ is not an invariant function, since it is not equal to $A_0A_2-A_1^2$; but the relation $a_0a_2-a_1^2=0$ is invariant, since its fulfilment necessitates $A_0A_2-A_1^2=0$. This is sometimes expressed by saying that the function is a *relative* invariant.

It is usual, however, to modify somewhat the general definition as follows: A function of the coefficients of a quantic is said to have the invariant property when it is equal to the same function of the coefficients of the transformed quantic, except for a factor depending only upon the coefficients of the linear transformation. Thus if $\phi(a)$ is such a function, where a denotes the coefficients collectively, and if A denotes the coefficients in the new form, then

$$(3)\quad \phi(A)=M\phi(a),$$

where M depends only on the transformation coefficients.

All such functions can be expressed in terms of rational integral functions with the same property. These are termed simply invariants. Thus an *invariant* is a rational integral function of the coefficients with the property expressed by (3).

16. A *covariant* of a quantic differs from an invariant only in that it involves both the coefficients and the variables. Its defining property is expressed by

$$(3')\quad \phi(A, X)=M\phi(a, x).$$

Thus the binary cubic

$$a_0x_1^3+3a_1x_1^2x_2+3a_2x_1x_2^2+a_3x_2^3$$

has the covariant

$$(a_0a_2-a_1^2)x_1^2+(a_0a_3-a_1a_2)x_1x_2+(a_1a_3-a_2^2)x_2^2;$$

for when the cubic is linearly transformed, it is found that the corresponding expression

$$(A_0A_2-A_1^2)X_1^2+(A_0A_3-A_1A_2)X_1X_2+(A_1A_3-A_2^2)X_2^2,$$

built from the new coefficients and variables, reduces to the original expression multiplied by $(l_1m_2-l_2m_1)^2$.

17. Invariants and covariants are collectively termed concomitants or, more simply, *comitants*. We give now a few of their important general properties.

A comitant is homogeneous in the coefficients (a) and in the variables (x). Its dimension in the former is termed its degree (d); its dimension in the latter, its order (m). For an invariant, of course, $m=0$.

The factor M produced by the linear transformation is for every comitant an entire power of the modulus Δ. Hence

$$(4)\quad \phi(A, X)=\Delta^w\phi(a, x).$$

The exponent w is termed the *weight* of the comitant.

The proof of the first theorem depends on the use of linear transformations of the special type $x_1=\rho X_1$, $x_2=\rho X_2$; that of the second theorem depends on the group property of linear transformations and the fact that Δ is not factorable.

18. The weight w, order m, and degree d of any comitant of a binary n-ic are connected by the relation

$$2w=nd-m.$$

This holds in the example given in No. 16, where $n=3$, $m=2$, $d=2$, $w=2$.

Taking $m=0$ and n odd, we have the corollary. A binary form of odd order cannot have an invariant of odd degree.

When n is even, so is m. Hence a binary form of even order cannot have a covariant of odd order.

19. The preceding definitions and theorems may readily be extended to *simultaneous* comi-

tants, that is, invariants and covariants of two or more forms.

20. An important process for the formation of simultaneous comitants depends on this principle: If in an invariant $\phi(a_0, a_1, \ldots a_n)$ of a single form f, we substitute $a_0 + \kappa b_0$ for a_0, $a_1 + \kappa b_1$, for a_1, etc., and expand the result according to powers of κ, the first term is the original invariant $\phi(a)$, the coefficient of κ^θ is the corresponding invariant $\phi(b)$ of a form g with coefficients $b_0, b_1, \ldots b_n$, and the remaining coefficients are simultaneous in variants of f and g.

For example, when this principle is applied to the invariant $a_0a_2 - a_1^2$ of a quadric $f = a_0x_1^2 + 2a_1x_1x_2 + a_2x_2^2$, we have

$$(a_0 + \kappa b_0)(a_2 + \kappa b_2) - (a_1 + \kappa b_1)^2$$
$$= a_0a_2 - a_1^2 + \kappa(a_0b_2 - 2a_1b_1 + a_2b_0) + \kappa^2(b_0b_2 - b_1^2).$$

It follows that $a_0b_2 - 2a_1b_1 + a_2b_0$ is a simultaneous invariant of f and $g = b_0x_1^2 + 2b_1x_1x_2 + b_2x_2^2$.

The coefficient of the first power of κ, by Taylor's theorem, is

$$b_0\frac{\partial\phi}{\partial a_0} + b_1\frac{\partial\phi}{\partial a_1} + \ldots + b_n\frac{\partial\phi}{\partial a_n}.$$

Hence if the operation $b_0\frac{\partial}{\partial a_0} + b_1\frac{\partial}{\partial a_1} + \ldots + b_n\frac{\partial}{\partial a_n}$ is applied to an invariant of a single form, the result is an invariant of two forms. The operation is known as the *Aronhold process.*

21. In the domain of simultaneous comitants the distinction between invariants and covariants may be said to disappear. All the covariants of a form f may be obtained from the simultaneous invariants of f and a linear form $u_1x_1 + u_2x_2$ by the substitution of x_2 for u_1 and $-x_1$ for u_2.

22. *Geometric Interpretation.*— If a binary form f of nth order is equated to zero, the resulting equation, by the fundamental theorem of algebra, determines n values of the ratio $x_1 : x_2$. Taking $x_1 : x_2$ as homogeneous coordinates of a point on a straight line, we thus obtain a definite set of n points corresponding to the form f. Conversely, if a set of n points is given, the form f is determined (except for a numerical factor).

Linear transformation of x_1, x_2 has the same effect upon the points of the line as the projection of the given line upon a second followed by the displacement of the second line upon the first. Hence an invariant of f equated to zero represents a projective relation between the corresponding n points, that is, a relation not altered by the process of projection. Similarly, a covariant of order m represents a set of m points projectively related to points defined by f.

Thus, the vanishing of the invariant $a_0a_2 - a_1^2$ of a quadric form means that the two root points coincide. Again, the vanishing of $a_0b_2 - 2a_1b_1 + a_2b_0$, derived in No. 21, means that the pairs of points represented by the two quadrics are situated harmonically.

The interpretation often suggests the invariant character of complicated algebraic functions. For example, the *resultant* of two equations, $f = 0$, $g = 0$ (that is, the expression which vanishes when and only when the equations have a common root), is a simultaneous invariant of f and g. The condition that the equation $f = 0$ shall have equal roots leads to an invariant termed the *discriminant* of f.

23. *Absolute Invariants.*— By considering fractional instead of integral functions of the coefficients, it is possible to obtain *absolute invariants,* that is, functions which are unaltered by linear transformation. The factor M in (3) is then unity. An absolute invariant is necessarily the ratio of two (relative) invariants having the same weight. We give an example in connection with the form of fourth order. Here there are two invariants I and J with weights 3 and 2 respectively. Linear transformation affects them as follows: $I' = \Delta^3 I$, $J' = \Delta^2 J$. Hence $I'^2/J'^3 = I^2/J^3$. That is, I^2/J^3 is an absolute invariant.

Geometrically, every absolute invariant of any number of forms is expressible in terms of cross ratios of the corresponding points.

24. *The Symbolic Notation.*— The most powerful method for attacking the general problem of our subject, the determination of all the comitants of any number of forms and their interrelations, is the so-called *symbolic* method. The origin of the method is to be found in Cayley's hyperdeterminants (1845), but the symbolic notation itself is due to Aronhold (1859). The general theory was developed by Clebsch and Gordan (1870–).

A binary form of nth order is represented by the nth power of a linear form,

$$f = (a_1x_1 + a_2x_2)^n.$$

Here the a's are merely symbols which have a real meaning only in the combinations

$$a_1^n = a_0,\ a_1^{n-1}a_2 = a_1,\ a_1^{n-2}a_2^2 = a_2,\ \ldots,\ a_2^n = a_n.$$

The Roman letters denote real coefficients and the Greek letters symbolic coefficients. The latter were termed *umbrae* (shadows of quantities) by Sylvester.

A combination of a's of dimension $< n$ has no real meaning. On the other hand, if the dimension is a multiple of n, there are several corresponding real quantities. Thus $a^{m-2}a_2^2$ represents both a_0a_2 and a_1^2. This ambiguity is removed by introducing several equivalent sets of umbral quantities, each entering in precisely the nth dimension. We abbreviate by writing $a_1x_1 + a_2x_2 = a_x$, $\beta_1x_1 + \beta_2x_2 = \beta_x$, etc. The given form is then

$$f = a_x^n = \beta_x^n = \gamma_x^n, \text{ etc.}$$

The fundamental theorem is as follows: Every comitant of binary forms f is expressible symbolically as a combination of determinants of the type $(a\beta) = a_1\beta_2 - a_2\beta_1$ and linear factors of the type $a_x = a_1x_1 + a_2x_2$. In the case of invariants, only the determinants are involved. Conversely, all combinations of these two types (in which each set of symbols is involved in the proper dimension) represent comitants.*

Thus the quadric $f = a_x^2 = \beta_x^2$ has the invariant $(a\beta)^2$. Expanding, we have

$$(a_1\beta_2 - a_2\beta_1)^2 = a_1^2\beta_2^2 - 2a_1a_2\beta_1\beta_2 + a_2^2\beta_1^2$$
$$= a_0a_2 - 2a_1a_1 + a_2a_0,$$

which is simply twice the discriminant $a_0a_2 - a_1^2$.

25. *Transvectants.*—Among the comitants of two forms, $f = a_x^n$, $g = \beta_x^m$ (here a and β are

* Sylvester observed certain formal analogies between this symbolism and that employed in chemistry, and developed a so-called chemico-algebraic theory. Consult Grace and Young, 'Algebra of Invariants,' (Cambridge 1903, p. 366).

non-equivalent symbols), those represented by $(\alpha\beta)^\kappa a_x^{n-\kappa}\beta_x^{m-\kappa}$ are of special importance, since they are of the first degree in each set of coefficients. They are termed the *transvectants* of f and g and are denoted by $(f, g)^\kappa$. Gordan has shown that all comitants may be derived by the repeated application of the process of transvection.

The first transvectant of two forms is termed their *Jacobian;* its non-symbolic value is $\frac{\partial f}{\partial x_1}\frac{\partial g}{\partial x_2} - \frac{\partial f}{\partial x_2}\frac{\partial g}{\partial x_1}$. The transvectant $(f, f)_2$ is termed the *Hessian* of f; its non-symbolic value is $\frac{\partial^2 f}{\partial x_1^2}\frac{\partial^2 f}{\partial x_2^2} - \left(\frac{\partial^2 f}{\partial x_1 \partial x_2}\right)^2$.

26. *Complete Systems.*—In general, a set of forms has an infinite number of comitants. Thus any entire power of a comitant, or a product of powers of two comitants, is also a comitant. It is evident, however, that there cannot exist an infinite number of algebraically independent comitants, since all are functions of a finite number of coefficients and variables. The following result is fundamental in the systematic theory: For a given set of forms there exists a finite number of comitants such that every comitant of the forms is a rational integral function of the selected comitants. The latter constitute the *complete system* of the given forms.

The proof was first given by Gordan (1870) by means of the symbolic method. It has since been simplified and generalized by numerous investigators—in particular, Hilbert.

27. We now give the complete systems for the forms of order 1, 2, 3, 4:

Linear form. No invariant; the only covariant is the given form $f = a_x$.

Quadric form. One invariant (the discriminant) $D = (\alpha\beta)^2$; one covariant $f = a_x^2$.

Cubic form. The only invariant is the discriminant $R = (\alpha\beta)^2(\alpha\gamma)\ (\beta\delta)\ (\gamma\delta)^2$; in addition to $f = a_x^3$, there are two covariants, $H = (\alpha\beta)^2 a_x\beta_x$ (the Hessian of f) and $Q = (\alpha\beta)^2(\alpha\gamma)\beta_x\gamma_x^2$ (the Jacobian of f and H).

Quartic form. Two invariants, $I = (\alpha\beta)^4$, $J = (\alpha\beta)^2(\beta\gamma)^2(\gamma\alpha)^2$; three covariants, the given form $f = a_x^4$, its Hessian $H = (\alpha\beta)^2 a_x^2\beta_x^2$, and the Jacobian of f and H, namely, $T = (\alpha\beta)^2(\alpha\gamma)\ a_x\beta_x\gamma_x^3$.

Every invariant of the quartic form is thus a rational integral function of I and J; every comitant is a rational integral function of I, J, f, H, T.

28. The systems given are *irreducible;* that is, no member of a system can be expressed as a rational integral function of the other members of the system.

Complete irreducible systems have been calculated for single forms up to the order 10 and for pairs of forms up to the order 4. The system of the quintic contains 23 members.

While the finiteness of the system is assured, no general formula for the exact number of irreducible comitants is known.

29. *Ternary Forms.*—Many of the results stated for the binary case apply with little change to ultrabinary forms. There are, however, certain aspects of the general theory which are disguised when only the binary case is studied.

Consider a ternary form $f(x_1, x_2, x_3)$ of nth order. (The symbolic representation is a_x^n, where $a_x = a_1x_1 + a_2x_2 + a_3x_3$). If x_1, x_2, x_3 are taken as the homogeneous co-ordinates of a point in a plane, the equation $f = 0$ defines a curve of nth order. The vanishing of an invariant denotes a projective property of the curve. A covariant defines a curve which is projectively related to the original curve.

The principle of duality suggests the introduction of line co-ordinates u_1, u_2, u_3. When the x's undergo a linear transformation, the u's undergo another linear transformation, which is said to be *contragredient* to the first. A function involving the u's and having the invariant property is termed a *contravariant* of f. Geometrically it represents a curve considered as the envelope of its tangent lines. A *mixed* comitant is one involving both point co-ordinates and line co-ordinates; geometrically it defines a so-called *connex*.

The complete system of the ternary quadric $f = a_x^2$ consists of the covariant f, the invariant $D = (\alpha\beta\gamma)^2$, the contravariant $F = (\alpha\beta u)^2$, and the so-called identical form u_x. Here $(\alpha\beta\gamma)$ represents a determinant of third order $(a_1\beta_2\gamma_3)$. Geometrically, $f = 0$ represents a conic considered as a point locus, $F = 0$ represents the same conic regarded as line envelope, and $D = 0$ denotes that the conic degenerates to a pair of straight lines.

30. *Quaternary Forms.*—Here the essentially new feature is that in addition to point co-ordinates (x_1, x_2, x_3, x_4) and the dual plane co-ordinates (u_1, u_2, u_3, u_4), it is necessary to consider line co-ordinates $(p_{12}, p_{13}, p_{14}, p_{34}, p_{42}, p_{23})$. Comitants may contain, besides the coefficients of the given form, any combination of these types of variables. Little advance has yet been made in the complete treatment of even the simpler cases.

31. Gordon's method for proving the existence of a complete system applies only to binary forms. The proof for forms of any kind (including multiple forms containing two or more sets of variables) was first given by Hilbert (1890). The basis of his method is the following theorem, which has many important applications:

In any assemblage containing an infinite number of forms it is possible to select a finite number of members $F_1, F_2, \ldots, F_r$ so that every member can be written $F = P_1F_1 + P_2F_2 + \ldots + P_rF_r$, where the P's are forms not belonging necessarily to the given assemblage.

Other Invariant Theories.

32. *Special Linear Transformations.*—Forms have been treated with respect to linear transformations of special type. Thus the transformations $x_1 = aX_1 + \beta$, $y_1 = aY_1$ lead to the so-called *seminvariants* of binary forms.

Again, the formulas for passing from one system of rectangular co-ordinates to another,

$$(5) \qquad \begin{aligned} x &= X\cos\theta - Y\sin\theta + h, \\ y &= X\sin\theta + Y\cos\theta + k, \end{aligned}$$

constitute a special linear group. Invariants with respect to this group are termed Cartesian or metric or orthogonal. In the case of the conic $ax^2 + bxy + cy^2 + dx + ey + f = 0$, there are three such invariants, $a + c$, $b^2 - 4ac$, and the discriminant. The latter is the only one which is invariant in the projective theory.

If $a+c=0$, the conic is a rectangular hyperbola; if $b^2-4ac=0$, it is a parabola.

For any number of variables the linear transformations which leave a given quadric form unchanged constitute a type of group which arises in many applications (line and circle geometries, geometry on a quadric surface, etc.).

33. The general method of finding the invariants of any continuous group involving a finite number of parameters is due to Sophus Lie. An r parameter group is generated by r independent infinitesimal transformations; these determine a set of r partial differential equations whose solutions are the invariant functions.

34. A *differential invariant* is one that contains the derivatives of the variables. Thus for the group (5) the expression $\frac{y''}{(1+y')^{\frac{3}{2}}}$ is a differential invariant. It represents in fact the curvature of an arbitrary curve at a point; this is obviously independent of the system of axes to which the curve is referred.

35. Special theories of invariants have been constructed in connection with *differential equations*. Thus an ordinary linear equation,

$$\frac{d^ny}{dx^n}+p_1(x)\frac{d^{n-1}y}{dx^{n-1}}+\ldots+p_n(x)=0,$$

is converted into an equation of the same kind by the substitution $x=\phi(X)$, $y=Y\psi(X)$. The totality of substitutions here forms an infinite continuous group, since ϕ and ψ are arbitrary functions. By an invariant of the equation is meant a function of the coefficients p_1, p_2 . . . and their derivatives, which retains its value (except perhaps for a factor depending on the transformation) when formed from the coefficients of the new equation.

36. *Differential Forms.*— In the theory of surfaces the distance between two consecutive points of the surface is given by the formula $ds^2=E(u,v)du^2+2F(u,v)\,du\,dv+G(u,v)dv^2$. The second member is a binary quadratic differential form. Such forms possess a theory of invariants with respect to arbitrary change of variables. Any change is expressed by $u=\phi(U,V)$, $v=\psi(U,V)$, where ϕ, ψ are arbitrary functions. The simplest example of an invariant is the expression, depending on E, F, G and their partial derivatives, which represents the Gaussian curvature.

37. *Arithmetical Theory of Forms.*— In this theory, inaugurated by Gauss, the coefficients and variables involved are supposed to be whole numbers. Attention has been confined mainly to the binary quadratic $ax^2+2bxy+cy^2$. The transformations are defined by $x=\alpha X+\beta Y$ $y=\gamma X+\delta Y$, where the coefficients α, β, γ, δ are integers such that $\alpha\delta-\beta\gamma\neq 0$. In this case then, the group is discontinuous.

38. *Automorphic Functions.*— Such discontinuous groups arise also in the theory of functions. Thus in No. 7 it was seen that the trigonometric functions are unaltered by the substitutions $x=X+2k\pi$. Similarly, a doubly periodic function (of a complex variable) is invariant with respect to $z=Z+k_1w_1+k_2w_2$, where w_1, w_2 are the given periods and k_1, k_2 are arbitrary integers. The modular function is invariant with respect to the linear group $z=(\alpha Z+\beta)/(\gamma Z+\delta)$, where α, β, γ, δ are integers such hat $\alpha\delta-\beta\gamma=1$. The problem of finding all functions which admit an infinite discontinuous group of linear transformations is one of the most important in recent investigation. Such functions are termed *automorphic*. They have been classified by Poincaré into Fuchsian and Kleinian according as the defining group involves real or complex coefficients.

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INVASION, the entry into a country by a public enemy. As early as 1795 Congress provided by law for protection against the invasion of the United States by any foreign nation or Indian tribe. The act made it lawful whenever there should be an invasion, or imminent danger of one, for the President to call out such number of the militia of the State or States convenient to the place of invasion as he might think necessary to repel it. This, strengthened in some respects by amendments, has been in force ever since. An invasion has usually all the elements of war, and the invaders may be dealt with as persons at war with the country invaded, in accordance with usages of warfare without the declaration of war by Congress. The Supreme Court of the United States has decided that a State is invaded when there is a domestic rebellion within its territory, and that the same rules of law may be enforced as in the case of an invasion by external foes. This decision practically abolishes all distinction between invasion and insurrection, and the same rules which furnish a remedy for invasion can be applied in the suppression of an insurrection or local rebellion. In case the State militia is not sufficiently strong, or not easily available, the standing troops of the United States may be ordered out by the President, if indeed it be necessary to call upon the State troops before resorting to the regular troops of the United States. It is not necessary that actual armed violence shall be resorted to in order to constitute insurrection. Any combination of persons too powerful to be suppressed by the ordinary course of judicial proceedings is tantamount to insurrection, and warrants the use of the effective measures provided for by law for its suppression.

As regards the rights of the invader many rules have been laid down, carefully distinguishing between invasion and conquest, especially with respect to private and public property. It is now held that public money, military stores and public buildings with their contents are lawful sources of plunder, and telegraph and railway property may be used as needs require. The unwarranted burning of the Capitol and other public buildings in Washington by the British in 1814; the removal of the Palatine libraries during the Thirty Years' War; the confiscation of the astronomical instruments in the Observatory of Peking by the Germans during the operations of the Allies against the Chinese capital — all these were in direct violation of the accepted rules of invasion. The levying of supplies, labor, forage, transportation facilities, etc., upon the native people is strictly within the lawful confines of invasion; for example, during the wars of Frederick the Great, both the Austrians and the Prussians were mainly supported by these enforced contributions of supplies. Napoleon was probably the greatest exponent of the belief that a war should support itself, either during the conflict, or by imposing a large indemnity, or both; hence we see that he exacted of Prussia, after the battle of Jena, more than a hundred million francs, and Spain was forced during the Peninsular War to pay a similar amount. The pillage of private property is prohibited, but should the owners give aid to their country, the property may be sold at the discretion of the invading general.

INVENTION OF THE CROSS, a festival held in honor of the finding of the true cross, on which Christ was crucified, by the Empress Helena A.D. 316, on Mount Calvary, celebrated on 3 May. Since 1895 the festival is called "Ritrovamento" as celebrating the refinding of the cross, which was identified and buried in the 1st century by Empress Protonice. See CROSS.

INVENTIONS. The progress of the world in its numerous vast industries and arts has been founded, to a very large extent, upon inventions and discoveries and their subsequent development. Under the American patent law and system, inventors all over the world are stimulated to make public their inventions by reason of receiving in exchange a monopoly in the form of a patent on the invention for a period of 17 years. The remarkable increase in the number of protected inventions is shown by the records of the United States Patent Office, as follows: At the end of the first year (1790) 3 patents were issued. In the year ending 1902, 27,136 patents were granted; in 1916, 43,970. The total number of patents issued from April 1790 to the end of 1918 was over 1,125,000. Carriages and wagons have been the subject of the greatest number of United States patents, nearly 40,000.

An invention is recognized to be any new or useful mechanical contrivance or article, method, discovery, composition of matter, or system not previously known or used, or any improvement on any known machine, art, method or system. Below is given in chronological order a list of important inventions and discoveries beginning with the 16th century, with the title of the invention, the year it was made, the name of the inventor and his nativity:

INVENTIONS	Date	Inventor	Nativity
Discoveries of Electrical Phenomena. Won the title of "founder of the science of electricity."	1560–1603	William Gilbert	England
Screw printing-press	1620	Blaew	Germany
Spirally grooved rifle barrel	1620	Koster	England
Iron furnaces	1621	Lord Dudley	England
The use of steam. The first authentic reference in English literature to the use of steam in the arts.	1630	David Ramseye	England
Bay Psalm Book, first book published in the Colonies	1640		Mass.
Barometer	1643	Torricelli	Italy
Steam engine, atmospheric pressure	1663	Thomas Newcomen	England
Machine for generating electricity	1681–86	Otto von Guericke	Germany
First paper mill in America	1690	William Rittenhouse	Penna.
First steam engine with a piston	1690	Denys Papin	France
The manufacture of plate glass established	1695		France
First to discover difference between electric conductors and insulators	1696–1736	Stephen Gray	England
The first practical application of the steam engine	1702	Thomas Savery	England
First newspaper in America. *Boston News Letter*	1704	John Campbell	Mass.
First to produce electric spark	1708–1716	Dr. J. Wall	England
Thermometer	1709	Fahrenheit	Danzig
Electrometer, the well-known pith ball	1718–1772	John Cantor	England
The "Franklin" printing-press	1725	Benj. Franklin	Utd.States
Stereotyping	1725	William Ged	Scotland
Electrical glass plate machine	1727–1772	Martin de Planta	France
First to discover that electricity is of two kinds	1733–39	Cisternay du Fay	France
Flying shuttle in weaving	1733	John Kay	England
Rotary 3-color printing-press (Multi-Color)	1743	Platt & Keen	England
Electric or Leyden jar	1745	Kleist	Germany
Substitution of coke for coal in melting iron	1750	Abraham Darby	England
Lightning conductor	1752	Benj. Franklin	Utd.States
Spinning jenny	1763	James Hargreaves	England
Piano forte, played in public in England in	1767		England
Drawing rolls in a spinning machine	1769	Richard Arkwright	England
The introduction of the "Hollander" or beating engine for pulping rags in the manufacture of paper	1773		
The mule spinner	1774	Samuel Crampton	England
Cut nails	1775	Jeremiah Wilkinson	Utd.States
Circular wood saw	1777	Miller	England
Embryo bicycle	1779	Branchard & Magurier	France
Steam engine, the basis of the modern engine	1782	James Watt	Scotland
Gas balloon	1783	J. E. & J. M. Montgolfier	France
Puddling iron	1783–84	Henry Cort	England

INVENTIONS	Date	Inventor	Nativity
Plow, with cast iron mold board, and wrought and cast iron shares	1784	James Small	Scotland
Power loom	1785	James Cartwright	England
First steamboat in the United States	1786	John Fitch	Utd. States
Steam road wagon (First automobile)	1787	Oliver Evans	Utd. States
Grain threshing machine	1788	Andrew Meikle	England
Uranium discovered	1789	Klaproth	Germany
Hobby-horse, forerunner of bicycle	1790		England
Rotary steam power printing-press, the first idea of	1790	Wm. Nicholson	England
Wood planing machine	1791	Samuel Bentham	England
Power platen printing press	1791	I. Treadwell	Utd.States
Gas first used as an illuminant	1792	Wm. Murdoch	England
Cotton gin	1794	Eli Whitney	Utd. States
Art of lithography	1796	Alois Senefelder	Germany
Machine for making continuous webs of paper	1800	Louis Robert	France
Steam coach	1801	Richard Trevithick	England
Wood mortising machine	1801	M. J. Brunel	England
Pattern loom	1801	M. J. Jacquard	France
First fireproof safe	1801	Richard Scott	England
Steamboat on the Clyde, *Charlotte Dundas*	1802	William Symington [Davy	England
First photographic experiments	1802	Wedgewood &	England
Planing machine	1802	J. Branch	England
The application of steam to the loom	1803	William Horrocks	England
Steel pen	1803	Wise	England
Steam locomotive on rails	1804	Richard Trevithick	England
Application of twin screw propellers in steam navigation	1804	John Stevens	Utd. States
Process of making malleable iron castings	1804	Lucas	England
First life preserver	1805	John Edwards	England
Electro-plating	1805	Luigi Brugnatelli	Italy
Knitting machine, the latch needle in the	1806	Jeandean	France
Steamboat navigation on the Hudson River	1807	Robert Fulton	Utd. States
Percussion or detonating compound	1807	A. J. Forsyth	Scotland
First street gas lighting in England	1807	F. A. Winsor	England
Band wood saw	1808	Newberry	England
Barium, strontium and calcium	1808	Sir Humphry Davy	England
Polarization of light from reflection	1808	E. L. Malus	France
Voltaic arc	1808	Sir Humphry Davy	England
First steamboat to make a trip to sea, the *Phœnix*	1808	John Stevens	Utd. States
Homeopathy introduced	1810	S. C. F. Hahnemann	Germany
Revolving cylinder printing-press	1810	Frederick Koenig	Germany
Breech-loading shotgun	1811	Thornton & Hall	Utd. States
Storage battery	1812	J. B. Ritter	Germany
Dry pile (prototype of dry battery)	1812	Zamboni	
First practical steam rotary printing press, paper printed on both sides	1814	Frederick Koenig	Germany
First locomotive in Scotland	1814	George Stephenson	England
First circular wood saw made in this country	1814	Benjamin Cummings	Utd. States
Heliography	1814	Jos. N. Niepce	France
Discovery of cyanogen	1814	Gay Lussac	France
Kaleidoscope	1814	Sir David Brewster [Davy	England
Miner's safety lamp	1815	Sir Humphry	England
Seidlitz powder	1815		
Dry gas meter	1815	S. Clegg	England
Morphine, first organic alkaloid known	1816	Sertüner	Germany
Knitting machine	1816	Brunel	England
"Draisine" bicycle	1816	Baron von Drais	Germany
"Columbian" press, elbowed pulling bar, number of impressions per hour, 200	1817	George Clymer	Utd. States
Stethoscope	1819	Laënnec	France
Electro-magnetism discovered	1819	H. C. Oersted	Germany
Lathe for turning irregular wood forms	1819	Thomas Blanchard	Utd. States
The theory of electro-dynamics first propounded	1820	Andre Ampère	France
Quinine	1820	Pelletier & Caventon	France
Electroscope	1820	Bohenberg	Germany
The conversion of the electric current into mechanical motion	1821	Michael Faraday	England
Galvanometer	1822	Schweigger	Germany
Multi-color printing	1822	P. Force	Utd. States
Calculating machine	1822	Charles Babbage	England
Silicon	1823	James Berzelius	Switzerl'd
Discovery of thermo-electricity	1823	Prof. Seebeck	England
Liquefaction and solidification of gas	1823	Michael Faraday	England
Water gas, production of	1823	Ibbetson	England
Portland cement	1825	Joseph Aspdin	England
First passenger railway, opened between Stockton and Darlington, England	1825		
Electrical spur wheel	1826	Barlow	England
Bromine	1826	M. Balard	France
First railroad in United States, near Quincy, Mass	1826		
The law of galvanic circuits formulated	1827	George S. Ohm	Germany
Friction matches	1827	John Walker	Utd.States
The reduction of aluminium	1827	Frederich Wohller	Germany
Law of electrical resistance	1827	George S. Ohm	Germany
Improved rotary printing-press London *Times*, 5,000 impressions per hour	1827	Cowper & Applegarth	England
Hot air blast for iron furnaces	1828	J. B. Neilson	Scotland
Wood planing machine	1828	William Woodworth	Utd. States
Tubular locomotive boiler	1828	Séquin	France
Prism for polarized light	1828	Nicol	England
Spinning ring frame	1828	John Thorp	England
Type casting and setting machine	1828	Wm. Church	Utd. States
The "Washington" hand printing press	1829	Samuel Rust	Utd. States
Papier-mache stereotyping	1829	Genoux	France
First steam locomotive in United States, "Stourbridge Lion"	1829		
Double fluid galvanic battery	1829	A. C. Becquerel	France
Magnesium	1829	Adam Bussey	France
First portable steam fire engine	1830	Brathwaite & Ericsson	England

INVENTIONS	Date	Inventor	Nativity
Magneto-electric induction	1831	Michael Faraday	England
Chloroform	1831	G. J. Guthrie	Scotland
First conception of electric telegraph	1832	Prof. S. F. B. Morse	Utd. States
First magneto-electric machines	1832	Saxton	Utd. States
Rotary electric motor	1832	Wm. Sturgeon	England
Chloral-hydrate	1832	Justus von Liebig	Germany
Locomotive, "Old Ironsides" built	1832	M. W. Baldwin	Utd. States
Link-motion for locomotives	1832	Sir Henry James	England
Adoption of steam whistle for locomotives	1833	George Stephenson	England
Reciprocating saw-tooth cutter within double guard fingers for reapers	1833	Obed Hussey	Utd. States
"McCormick" reaper	1834	Cyrus H. McCormick	Utd. States
Rotary electric motor	1834	M. H. Jacobi	Russia
Carbolic acid discovered	1834	Runge	Germany
Horse shoe machine	1835	H. Burden	Utd. States
Constant electric battery	1836	J. P. Daniell	England
Acetylene gas discovered	1836	Edmund Davy	England
The revolver; a device "for combining a number of long barrels so as to rotate upon a spindle by the act of cocking the hammer."	1836	Samuel Colt	Utd. States
The screw applied to steam navigation	1836 1841	John Ericsson	Utd. States
The galvanizing of iron	1837	Henry Craufurd	England
Indicator-telegraph	1837	Cooke & Wheatstone	England
Photographic carbon printing	1838	Mungo Ponton	France
Babbitt metal	1839	Isaac Babbitt	Utd. States
Vulcanization of rubber	1839	Charles Goodyear	Utd. States
The first boat electrically propelled	1839	Jacobi	Germany
Daguerreotype	1839	Louis Daguerre	France
First to produce a direct photographic positive in the camera by means of highly polished silver surfaced plate exposed to the vapors of iodine and subsequent development with mercury vapor.			
Making photo-prints from paper negatives (First production of positive proofs from negatives).	1839	Fox Talbot	England
Photographic portraits. (Daguerreotype process)	1839	Draper & Morse	Utd. States
Pneumatic caissons	1841	M. Triger	France
Pianoforte automatically played	1842	M. Seytre	France
Steam hammer	1842	James Nasmyth	Scotland
Typewriting machine	1843	Charles Thurber	Utd. States
First telegram sent	1844	Prof. S. F. B. Morse	Utd. States
The use of nitrous oxide gas as an anæsthetic	1844	Dr. Horace Wells	Utd. States
The electric arc light (gas retort carbon in a vacuum)	1844	Léon Foucault	France
Automatic adjustment of electric arc light carbons	1845	Thomas Wright	England
Double cylinder printing-press	1845	R. Hoe & Co.	Utd. States
Pneumatic tire	1845	R. W. Thompson	England
Sewing machine	1846	Elias Howe	Utd. States
Suez Canal started	1846	De Lesseps	France
Ether as an anæsthetic	1846	Dr. Morton	Utd. States
Artificial limbs	1846		
Gun cotton	1846	Schönbein	Germany
First pianoforte keyboard player	1846	Debain	France
Chloroform in surgery	1847	Dr. Simpson	Scotland
Nitro-glycerine	1847	Sobrero	Scotland
Time-lock	1847	Savage	Utd. States
Hoe's type-revolving cylinder printing-press	1847	Richard M. Hoe	Utd. States
Match-making machinery	1848	A. L. Dennison	Utd. States
Breech gun-lock, interrupted thread	1849	Chambers	Utd. States
Magazine gun	1849	Walter Hunt	Utd. States
Steam pressure gauge	1849	Bourdon	France
Lenticular stereoscope	1849	Sir David Brewster	England
Latch needle for knitting machine	1849	J. T. Hibbert	Utd. States
"Corliss" engine	1849	G. H. Corliss	Utd. States
Printing-press, curved plates secured to a rotating cylinder	1849	Jacob Worms	France
Mercerized cotton	1850	John Mercer	England
Collodion process in photography	1850	Scott Archer	England
American machine-made watches	1850		Utd. States
Electric locomotive	1851	Dr. Page	Utd. States
Self-raker for harvesters	1851	W. H. Seymour	Utd. States
Gordon job printing press	1851	Geo. P. Gordon	Utd. States
Breach loading rifle	1851	Maynard	Utd. States
Icemaking machine	1851	J. Gorrie	Utd. States
The Rhumkorff coil	1851	Rhumkorff	Germany
Fire-alarm telegraph	1852	Channing & Farmer	Utd. States
Reticulated screen for half-tone photographic printing	1852	Fox Talbot	England
Soda process of making pulp from wood	1853	Watt & Burgess	Utd. States
Laws of magneto-electric induction	1853	Michael Faraday	England
Laws of electrostatics	1853	Michael Faraday	England
Electrolysis	1853	Michael Faraday	England
Duplex telegraph	1853	Gintl	Austria
First efficient type-setting machine	1853	W. H. Mitchell	Utd. States
Photographic roll films	1854	Melhuish	England
Diamond rock drill	1854	Herman	Utd. States
Four motion feed for sewing machines	1854	A. B. Wilson	Utd. States
Magazine firearm	1854	Smith & Wesson	Utd. States
Fat decomposed by water or steam at high temperature, since largely used in soap making	1854	R. A. Tilghman	Utd. States
Safety matches	1855	Lundstrom	Sweden
Iron-clad floating batteries first used in Crimean War	1855		
Cocaine	1855	Gaedeke	Germany
Process of making steel, blowing air through molten pig-iron	1855	Sir Henry Bessemer	England
Dryplate photography	1855	J. M. Taupenot	
Bicycle	1855	Ernst Michaux	France
Sleeping car	1856	Woodruff	Utd. States
Aniline dyes	1856	Perkins	England
Printing machine for the blind (contains elements of the present typewriting machine)	1856	Alfred E. Beach	Utd. States
Regenerative furnace	1856	Wm. Siemens	England
Refining engine in paper pulp making	1856	T. Kingsland	Utd. States
Coal-oil first sold in the United States	1857	Stout & Hand	Utd. States

INVENTIONS	Date	Inventor	Nativity
First seagoing iron-clad war vessel, the *Gloire*	1857		France
Ground wood pulp	1858	Henry Voelter	Germany
Inclined elevator and platform in the reaper	1858	J. S. Marsh	Utd. States
Cable car	1858	E. A. Gardner	Utd. States
Breech loading ordnance	1858	Wright & Gould	Utd. States
Feed injector for boilers	1858	Giffard	France
Storage or secondary battery	1860	Gaston Planté	France
Singing telephone	1860	Philip Reis	Germany
Ammonia absorption ice machine	1860	F. P. E. Carré	France
Improved stereotyping process	1861	Charles Craske	Utd. States
Shoe sewing machine.	1861	George McKay	Utd. States
Driven well, a tube with a pointed perforated end driven into the ground	1861	Col. N. W Green	Utd. States
Passenger elevator	1861	E. G. Otis	Utd. States
Barbed wire fence introduced	1861		Utd. States
Calcium carbide produced	1862	Frederich Woehler	Germany
Revolving turret for floating battery	1862	Theodore Timby	Utd. States
First iron-clad steam battery *Monitor*	1862	John Ericsson	Utd. States
Gatling gun	1862	Dr. R. J. Gatling	Utd. States
Smokeless gunpowder	1863	J. F. E. Schultze	Prussia
Pneumatic pianoforte player (regarded as first to strike keys by pneumatic pockets)	1863	M. Fourneaux	France
Explosive gelatine	1864	A. Nobel	Sweden
Rubber dental plate	1864	J. A. Cummings	Utd. States
Automatic grain binding device	1864	Jacob Behel	Utd. States
Process of making fine steel	1865	Martin	Utd. States
Antiseptic surgery	1865	Sir Joseph Lister	England
Web-feeding printing press	1865	William Bullock	Utd. States
Automatic shell ejector for revolver	1865	W. C. Dodge	Utd. States
The Atlantic cable laid	1866	Cyrus W. Field	Utd. States
Open-hearth steel process	1866	Siemens-Martin	England
Compressed air rock drill	1866	C. Burleigh	Utd. States
Torpedo	1866	Whitehead	Utd. States
Dynamo electric machine	1866	Wilde	England
Sulphite process for making paper pulp from wood	1867	Tilghman	Utd. States
Disappearing gun carriage	1868	Moncrief	England
First practical typewriting machine	1868	C. L. Sholes	Utd. States
Dynamite	1868	A. Nobel	Sweden
Oleomargarine	1868	H. Mege	France
Water heater for steam fire engine	1868	W. A. Brickell	Utd. States
Sulky plow	1868	B. Slusser	Utd. States
Railway air brake	1869	George Westinghouse	Utd. States
Tunnel shield (operated by hydrauiic power)	1869	Alfred E. Beach	Utd. States
A curved spring tooth harrow	1869	David L. Garver	Utd. States
Dynamo-electric machine	1870	Gramme	France
Celluloid	1870	J. W. & Isaac Hyatt	Utd. States
Rebounding gun-lock.	1870	L. Hailer	Utd. States
The Goodyear welt shoe-sewing machine	1871	Goodyear	Utd. States
Photographic gelatino bromide emulsion (basis of present rapid photography)	1871	R. L. Maddox	England
Continuous web printing-press	1871	Hoe & Tucker	Utd. States
Grain binder	1871	S. D. Locke	Utd. States
Compressed air rock drill	1871	S. Ingersoll	Utd. States
Positive motion weaving loom	1872	J. Lyall	Utd. States
Theory that light is an electric phenomenon	1872	Clerk Maxwell	England
Automatic air brake	1872	George Westinghouse	Utd. States
Automatic car coupler	1873	E. H. Janney	Utd. States
The photographic platinotype process. Prints by this process are permanent	1873	Willis	England
Quadruplex telegraph	1873	T. A. Edison	Utd. States
Twine binder for harvesters	1873	M. L. Gorham	Utd. States
Gelatino bromide photographic emulsion. (Sensitiveness to light greatly increased by the application of heat)	1873	Charles Bennett	England
Self-binding reaper	1873	Locke & Wood	Utd. States
Barbed wire machine	1874	Glidden & Vaughan	Utd. States
Siphon recorder for submarine telegraphs	1874	Sir William Thompson	England
Store cash carrier	1875	D. Brown	Utd. States
Illuminating water gas	1875	T. S. C. Lowe	Utd. States
Roller flour mills	1875	P. Wegmann	Utd. States
Middlings purifier for flour	1875	Geo. T. Smith	Utd. States
Ice making machine	1875	R. P. Pictet	Switzerl'd
Speaking telephone	1876	Graham Bell	Utd. States
Electric candle	1876	Paul Jablochkoff	Russia
The first satisfactory web perfecting printing press	1876	Andrew Campbell	Utd. States
Continuous machine for making tobacco cigarettes	1876	Russell	Utd. States
Steam feed saw mills	1876	D. C. Prescott	Utd. States
The first Portland cement plant in U. S.	1876		Coplay, Pa.
Phonograph	1877	T. A. Edison	Utd. States
Gas engine	1877	N. A. Otto	Utd. States
Carbon microphone	1877	T. A. Edison	Utd. States
Telephone transmitter of variable resistance	1877	Emil Berliner	Utd. States
Carbon filament for electric lamp (Beginning of the incandescent vacuum electric light.)	1878	T. A. Edison	Utd. States
Half-tone engraving process	1878	Divided	
Rotary disc cultivator	1878	Mallon	Utd. States
Decided advance in the "Expression" of self-playing pianofortes	1878	Gally	Utd. States
Automatic grain binder	1879	J. F. Appleby	Utd. States
Kathode rays discovered	1879	Sir Wm. Crookes	England
Steam plow	1879	W. Foy	Utd. States
Magazine rifle	1879	Lee	Utd. States
"Blake" telephone transmitter	1880	Blake	Utd. States
Hammerless gun	1880	Greener	Utd. States
Storage battery or accumulator	1880	Camille A. Faure	France
Typhoid bacillus isolated	1880	Eberth & Koch	Germany
Pneumonia bacillus isolated	1880	Sternberg	Utd. States
Button hole machine.	1881	Reece	Utd. States
Improvement in "Expression" of self-playing pianofortes	1882	Schmaele	Utd. States
Hand photographic camera for piates	1881	Wm. Schmid	Utd. States
Tuberculosis bacillus isolated	1882	Robert Koch	Germany

INVENTIONS	Date	Inventor	Nativity
Hydrophobia bacillus isolated	1882	Louis Pasteur	France
Cholera bacillus isolated	1884	Robert Koch	Germany
Diphtheria bacillus isolated	1884	Loeffler	Germany
Lockjaw bacillus isolated	1884	Nicolaier	France
Antipyrene	1884	Kuno	Utd. States
Linotype machine	1884	Ottmar Mergenthaler	Utd. States
The rear-driven chain safety bicycle	1884	George W. Marble	Utd. States
Chrome tanning of leather	1884	Schultz	Utd. States
Process of reducing aluminum	1885	Cowles	England
Gas burner	1885	Carl Welsbach	Austria
Hydraulic dredge	1885	Bowers	Utd. States
First electric railway in United States, Hampden and Baltimore, Md	1885		
Contact device for overhead electric trolley	1885	C. J. Van Depoele	Utd. States
Graphophone	1886	Bell & Tainter	Utd. States
Electric welding	1886	Elihu Thompson	Utd. States
Combined harvester and thresher	1886	Matteson	Utd. States
Band wood saw	1887	D. C. Prescott	Utd. States
Cyanide process of obtaining gold and silver	1887	McArthur & Forrest	Utd. States
System of polyphase electric currents	1887	Nicola Tesla	Utd. States
Incandescent gas light. The formation of a cone-shaped interwoven mantle of thread coated with a refactory rare earth and rendering the same incandescent by the heat rays of a Bunsen gas burner regardless of how the gas is produced.	1887	Carl A. von Welsbach	Austria
Process of annealing armor plate	1888	Harvey	Utd. States
"Kodak" snap-shot camera. Constructed to use a continuous sensitized ribbon film.	1888	Eastman & Walker	Utd. States
Process of making artificial silk	1888	H. DeChardonet	France
Hertzian waves or electric wave radiation	1888	Heinrich Hertz	Germany
First practical "horseless carriage"	1889	Serpollet	France
Electrolytic refining	1889	Weston et al.	Utd. States
First rotary cement kilns in U. S.	1889		Coplay, Pa.
Nickel steel	1889	Schneider	Utd. States
Process of making aluminum	1889	Chas. M. Hall	Utd. States
Electric plow	1890	W. Stephens	Utd. States
Improved linotype machine	1890	Ottmar Mergenthaler	Utd. States
Bicycles equipped with pneumatic tires	1890		
Krag-Jorgensen magazine rifle	1890	Krag-Jorgensen	Utd. States
"Coherer" for receiving electric waves	1891	Edouard Branly	England
Rotary steam turbine	1891	C. A. Parsons	England
Cement lined paper pulp digester	1891	G. F. Russell	Utd. States
Round bale cotton press	1891	Brown	Utd. States
Microphone	1891	Emile Berliner	Utd. States
Power loom	1891	Northrup	Utd. States
Commercial application of Formic-aldehyde	1892	J. J. A. Trillat	France
Wireglass	1892	Frank Shuman	Utd. States
Gasoline motor	1892	Otto Daimler	France
Shoe-last lathe for different lengths	1893	Kimball	Utd. States
Kinetoscope	1893	T. A. Edison	Utd. States
Process for making carborundum	1893	E. G. Acheson	Utd. States
Calcium carbide produced in electric furnace	1893	Thos. L. Willson	Utd. States
Argon, a chemical element	1894	Lord Rayleigh and Sir Wm. Ramsay	England
Process for liquefying air	1895	Carl Linde	Germany
Electric locomotive, B. & O. Belt Tunnel	1895		Utd. States
X-Rays	1895	Prof. W. C. Roentgen	Germany
Acetylene gas from calcium carbide	1895	Thos. L. Willson	Utd. States
Motorcycle	1895	Wolfmuller and Geisenhof	Germany
Steam disc plows	1896	Hardy	Utd. States
System of wireless telegraphy	1896	G. Marconi	Italy
Foundation laid of science of radio-activity, i.e., emanation of penetrating rays from luminescent bodies	1896	Henri Becquerel	France
Machine for blowing glass bottles	1896		Utd. States
Use of ultra-violet rays in treating diseases	1896	Niels R. Finsen	Denmark
Nernst electric light	1897	Walter Nernst	Germany
Method of rendering a clay compound capable of conducting electricity and thence becoming brilliantly incandescent without a vacuum.			
Internal combustion engine	1897	Diesel	Germany
Thermit process	1897	Goldschmidt	Germany
Ore-unloader	1898	G. H. Hulett	Utd. States
Radium discovered	1898	Madame S. Curie	France
Mercury vapor electric light	1900	Peter Cooper Hewitt	Utd. States
Auto plate	1900	H. A. W. Wood	Utd. States
Ocean-going submarine	1900	Credit divided	
Electrolytic steel	1900	Kjellin-Heroult	
High speed steels	1900	Taylor & White	Utd. States
Ocean wireless telegraphy	1901	G. Marconi	Italy
Air-ship	1901	M. Santos-Dumont	France
Automobile mower	1901	Deering Harvester Co.	Utd. States
The first passenger steam turbine ship, *Edward VII*	1901	Denny & Brothers	England
Nitrogen from air	1903	Birkeland	Norway
Nickel storage battery	1903	Edison	Utd. States
Aeroplane	1905	Wright Brothers	Utd. States
Gyroscopic compass	1906	Anschutz-Kampfle	Germany
Caterpillar tractor, predecessor of the War "tank"	1906	D. Roberts	Utd. States
Removable auto-tire	1907	Disputed	
Cracking oils for gasoline	1908	Divided credit	
Kinemacolor moving pictures	1911	Urban-Smith	England
Metal-spraying plating machine	1913	M. U. Schoop	Swiss
Air-cooled gun	1914	I. N. Lewis	Utd. States
Phonopticon	1915	F. C. Brown	Utd. States
70-mile gun	1918		Germany

It is interesting to note that between the years 1872 and 1915 there were on what may be termed the honor roll of inventors over 40 inventors each of whom had received over 100 patents. A few of the most important include Thomas A. Edison, 977; Francis H. Richards, 847; Elihu Thompson, 617; Charles E. Scribner, 437; George Westinghouse, 340; Edward Weston, 299.

In the preparation of the foregoing statistics, credit is given to L. H. Campbell, of the United States Patent Office, for valuable assistance.

FREDERICK C. BEACH, Ph.B.,
Late Editor of 'The Scientific American.'

INVENTORY, a detailed written schedule or list of chattels, goods, merchandise, debts, credits, lands, tenements, etc., made either for commercial purposes, or for legal proceedings, such as bankruptcy, etc. It began in Roman law, under which the heir, on filing an inventory of the decedent's estate, was not liable for the latter's indebtedness beyond the sum which descended to him. In nearly all modern legal systems executors and administrators are obliged to make an inventory of the property in their charge in order to secure it to the persons entitled to it. Guardians and curators in some jurisdictions are obliged to file inventories of the estates held in trust by them for their wards.

INVERARAY, Scotland, royal and municipal burgh, capital of Argyllshire, situated on Loch Fyne, at the mouth of the Aray, 40 miles northwest of Glasgow. The town contains an obelisk in memory of the Campbells who were hanged here without trial in 1685, an ancient market cross and a church. Herring fishing is the principal industry. It became a burgh in 1472 and was made a royal burgh in 1648. Inveraray Castle nearby is the seat of the dukes of Argyll. Pop. 533.

INVERCARGILL, New Zealand, city, situated on New River, South Island, some 17 miles inland and 140 southwest of Dunedin. Owing to its proximity to Foveaux Strait, the town enjoys considerable maritime prestige. It has three outlying towns on the Bluff, called North Invercargill, South Invercargill and East Invercargill. It is situated in a rich agricultural district, has manufactures of woolens and flour and saw mills. Pop. including suburbs 15,858.

INVERNESS, Canada, town of Inverness County, Nova Scotia, on the Inverness Railway and on Big River, 150 miles from Sydney. In the neighborhood are found coal, gypsum, copper and fire clay. Pop. 2,719.

INVERNESS, Scotland, a royal, municipal, police burg and capital of the county of the same name, chief town of the Highlands, situated at the mouth, and mostly on the right bank, of the river Ness, on the Highland Railway, 109 miles west northwest of Aberdeen. Its environs, well cultivated and beautifully wooded, are almost surrounded by mountains and hills of various heights, forming a picturesque and interesting landscape. Inverness is a very ancient town, and was one of the Pictish capitals. It has a quite modern appearance with wide streets, beautiful suburbs and fine villas. The first charters of Inverness as a burgh were granted by King William the Lion. In 1411 the town was burned by Donald, Lord of the Isles, on his way to the battle of Harlow and in 1427 a parliament was held here by James I. In High street stands the famous town cross and the Clach-na-cuddin, an ancient stone. In the same street are the town hall and the exchange. The town contains the Raining's School, a royal academy, Saint Andrew's Cathedral, a public library, infirmary, asylum and observatory. The industrial establishments comprise shipyards, woolen factories, foundries, tanneries, soap works, railway shops, saw mills, thread mills, etc. There is a considerable coasting trade. Pop. 22,216. Consult Grant, 'The Commissariat Record of Inverness' (Edinburgh 1897) and Mackintosh, 'Invernessiana' (Inverness 1875).

INVERNESS-SHIRE, Scotland, the largest county of the kingdom, includes Badenoch, Glenroy, and the valley of the Spey on the east, Lochaber on the south, Glenelg, Glen Garry, Arisaig. Moydart and Frazers County on the west, Glen Urquhart and Glen Morriston toward the centre. It includes also Strathglass on the north; and several of the western islands, viz., Skye, Harris, North and South Uist, and Barra, Eigg, etc. The mainland portion is bounded on the east by Aberdeen Banff, Elgin and Nairn, west by the Atlantic and Ross, north by Ross and Cromarty and south by Perth and Argyll. Its area is 4,211 square miles, of which more than two-thirds consist of barren heath. The wildest and most mountainous portion is toward the west, comprising a tract 70 miles in extent, designated the "Rough Bounds." The most extensive moss in Great Britain lies on the south of Badenoch, where, in the naturally formed wooded islands, large herds of deer find a refuge. The natural pines occupy a larger space than in any other county of Britain. Some mountains attain considerable height. Ben Nevis is 4,406 feet above sea-level and Cairngorm is over 4,000. The geological formation is various; but primary rocks consisting of gneiss, mica-slate, granite, porphyry, and trap rocks prevail. The most fertile soil of the county rests on the red sandstone in the valley of the Aird, and between the county town and Beauly. There are several lakes, as Loch Ness, Loch Lochy, Loch Laggan, Loch Ericht, etc. The principal rivers are the Spey, Lochy, Beauly, Findhorn, Nairn, Ness, Garry, Morriston and the Foyers. The land belongs to about 80 or 90 proprietors. The battle which decided the fate of the Stuarts was fought 16 April 1746 on Culloden Moor, a few miles from Inverness. The Gaelic language is spoken generally. Inverness is the only town. Pop. 87,270. Consult Lees, J. C., 'History of the County of Inverness' (Edinburg 1897).

INVERSION, a change of order whereby the first becomes last and the last first. (1) In rhetoric, a reversal of the natural order of words for the sake of euphony, emphasis or the like; also the turning of one's own argument against him by an opponent in discussion. (2) In chemistry, a change in molecular structure which is usually induced by fermentation or by heating with a dilute acid, as in the case of starch, sugar, etc. Thus starch and dextrine are changed into glucose, cane-sugar into invert sugar, and maltose into glucose. (3) In geology, the overturning or folding over of strata by igneous agency, so that the order of their succession seems reversed. (4) In mathematics, the operation of changing the order of the terms, so that the antecedent shall take the place of the consequent and the reverse, in both couplets. Thus, from the proportion $a : b :: c : d$, we have, by inversion, $b : a$

: : *d* : *c*. (5) In music, the transposition of certain phrases having a common root. (*a*) The change of a chord by making one of the inner notes act as a bass note, by which means as many inversions can be made as there are actual notes in the chord, not counting the root, the harmony in such inversions remaining the same, though the order of component parts is changed; (*b*) alteration of intervals by making that which was the upper note the lower, and the reverse, the inversion of an interval within the octave being readily found in the difference between the figure 9 and the interval known; (*c*) the alteration of a subject produced by inverting the intervals of which it consists.

INVERTASE, or **INVERTIN,** an enzyme occurring in many fungi, notably in certain yeasts (for example, the saccharomyces), and also in the seed-plants. It transforms cane-sugar into a mixture of dextrose and levulose; this mixture being called "invert-sugar" because it turns the plane of polarized light to the left, while the cane-sugar from which it is obtained turns it to the right. According to some writers, a yeast cannot invert cane-sugar except by secreting invertase; but *Monilia candida* effects the inversion, and yet produces no invertase. In this case the action is probably due to some other enzyme, hitherto unidentified. Invertase probably plays a very important part in vegetable chemistry. Like other enzymes, it can apparently perform an unlimited amount of chemical work, without sensible diminution of its own substance. (See FERMENTATION). Invertase is most active at a temperature of from 120° to 140° F., and in a slightly acid medium. It has been isolated in the form of a powder.

INVERTEBRATES, a collective term for the lower divisions or phyla of the animal series, which agree in not having a vertebral column or back-bone, used in contradistinction to the highest group of the animal kingdom, to which the name *Vertebrata* or vertebrate animals is given. In the system of Cuvier the *Invertebrata* were divided into the *Radiata, Articulata* and *Mollusca*. Further study revealed that these names did not distinguish natural groups; and the term *Invertebrata* has no longer any definite significance in classification.

INVESTITURE, the act of investment implying the right to give possession of an office, honor, benefice or manor. In the mediæval or feudal law, it was the open delivery of a feudal or a right to lands and hereditaments, by a lord to his vassal, thus, by external proof, affording evidence of proprietorship. To use the words of Blackstone, "Investitures, in their original ruse, were probably intended to demonstrate, in conquered countries, the actual possession of the lord, and that he did not grant a bare litigious right, but a peaceable and firm possession. At a time when writing was seldom practised, a mere oral gift, at a distance from the spot that was given, was not likely to be long or accurately retained in the memory of by-standers, who were very little interested in the grant." For this reason investiture was performed by the presentation of some symbol to the person invested, as a branch of a tree, etc. In the primitive church, after the election of a bishop, and his consecration, the early Christian emperors claimed a right of confirmation. Charlemagne is said to have introduced this practice, and to have invested the newly consecrated bishop by placing a ring and crozier in his hands. Gratian, indeed (Distinct. 63 cap. Adrianus), directly affirms that Pope Adrian positively conceded to the emperor the power of electing, even to the papacy, in 774; but neither Eginhard nor any other contemporary writer mentions this fact.

The custom, however, existed, nor does it appear to have been objected to or opposed during the lapse of two centuries from his reign. The disorderly state of Italy, which succeeded the death of Charlemagne, frequently interrupted the exercise of this right by the Carlovingians; but even so late as 1047, when the empire had passed to another line, Henry III received an explicit admission of his prerogative, and repeatedly used it. The investiture in the lesser sees followed as a matter of course. Alexander II issued a decree against lay investiture in general, which was revived by Gregory VII (Hildebrand), who, having succeeded in annulling the prerogative of the emperors to nominate or confirm popes, sought to disjoin entirely the ecclesiastical from the civil rule. It was not, however, until the papacy of Calixtus II, in 1122, that the question was terminated, as it appears, materially to the advantage of the holy see. In France, even under the papacy of Hildebrand, the right of investiture does not appear to have been made a subject of open quarrel. In spite of the protests of the holy see, the kings exercised the power, but at length relinquished the presentation of the ring and crozier, and contented themselves with conferring investiture by a written instrument, or orally, upon which they were left in peaceable possession of the power. But in England Paschal II was engaged in a contest little less fierce than that which he maintained with the emperor. Anselm, the primate, refused to do homage to Henry I for his see. The king seems to have asserted an unqualified right of investiture, which the Pope, who was appealed to, as unqualifiedly denied. After a protracted struggle, and continued threats of excommunication, the controversy ended in England, as it did afterward in Germany, by compromise. Paschal offered to concede the objections against homage provided Henry would forego the ceremony of investiture. To this he agreed (1107).

INVESTMENT BANKERS ASSOCIATION. See BANKS AND BANKING — BANKERS' ASSOCIATIONS IN THE UNITED STATES.

INVESTMENT BANKS AND BANKING. See BANKS AND BANKING — INVESTMENT BANKING.

INVINCIBLE ARMADA. See ARMADA.

INVINCIBLES, an Irish secret society of 1882, an off-shoot of the Fenians (q.v.). One of the objects of the Invincibles was to "remove" or assassinate government officers or others who might incur the displeasures of the association or its leaders. On 6 May 1882 the society succeeded in "removing" Lord Frederick Cavendish, who had just arrived from England as Secretary for Ireland, and Thomas A. Burke, the under-secretary, in the Phœnix Park at Dublin. The plot was directed against the lat-

ter gentleman, and the former, interfering to protect his friend, shared his fate. On 20 Feb. 1883 20 persons charged with complicity in the Phœnix Park murders were put on trial; on 14 July, Joseph Brady, who had been convicted of actual perpetration of the murder of Mr. Burke, was executed, as were others subsequently. The leading witness, who revealed all the secrets of his fellow conspirators, was James Carey of Dublin. He was shot dead near Natal, on 29 July, by an Irishman, O'Donnell, who was subsequently tried, and executed for his crime.

INVIOLABILITY. See INTERNATIONAL LAW.

INVOICE, a list or bill of goods; a detailed statement of merchandise in stock, or to be shipped. Very frequently an invoice accompanies a shipment of goods along with the bill of lading from the consignor to the consignee. An invoice is a memorandum and is not a document of title nor a contract of sale, and has no value in law other than memoranda. Invoices of foreign goods must be verified at tariff headquarters of some countries.

INVOLUCRE, *in botany,* a group of bracts surrounding flowers in their unexpanded state, and occupying a place on the floral axis beneath them after their expansion. The bracts which form an involucre are generally grouped in a whorl. The cup of the acorn, hazel-nut, etc., may be regarded as an involucre.

INVOLUTION, *in mathematics,* the raising a quantity to any power. Involution is the converse of evolution, in which the root of a quantity is extracted. See ALGEBRA; ARITHMETIC; GEOMETRY; CALCULUS, INFINITESIMAL.

IO, ī'ō, in Greek mythology, a daughter of Inachus; according to others of Iasus or Peiren. Zeus (Jupiter) fell in love with her. Hera (Juno) perceived the infidelity of her husband and resolved to be revenged on both. Zeus, to protect Io from the jealousy of Hera, changed her into a beautiful white heifer. Hera was not deceived and set a gad-fly to torment her, and persecuted her without a moment's rest through the world. The wanderings of Io in this condition were a favorite subject with the poets of ancient Greece. Also, in astronomy (1) the first satellite of Jupiter, discovered by Galileo in 1610. (2) The name of the 85th asteroid, discovered by Peters at Clinton, N. Y., 19 Sept. 1865.

IODINE, ī'ō-dīn or -dĭn, a non-metallic element, analogous in its general properties to chlorine and bromine. It was discovered by Courtois in 1811, in the mother-liquor of kelp that had been used for the production of sodium carbonate; occurring there in combination with sodium and magnesium. It is still obtained from the ashes of certain seaweeds, but the principal supply is now obtained from "caliche," a crude nitrate of sodium that occurs in immense quantities in northern Chile. In the preparation of the commercially pure nitrate of soda from caliche, the mother liquors, after the removal of the nitrate by crystallization, are found to contain large quantities of iodine, chiefly in the form of iodate of sodium, $NaIO_3$; and it is from this substance that the iodine of commerce is now chiefly prepared. The richest caliche contains about 3.5 pounds of iodine per ton.

In its ordinary form, iodine is a solid substance, melting at 237° F., and boiling at about 380° F. In a vacuum, iodine sublimes without melting. Solid iodine is soft and dark gray in color, with a metallic lustre. The vapor is violet in color, from which circumstance the element takes its name (Greek, "like a violet"). Chemically, iodine has the symbol I, and an atomic weight of 126.92 for O = 16. Solid iodine has a specific gravity of about 4.95 at ordinary temperature and a specific heat of about 0.05412. Its volume increases, on account of thermal expansion, by about 0.00013 of its own value for a rise of temperature of 1° F. At temperatures not far above its boiling point, the vapor of iodine has a specific heat (at constant pressure) of 0.03369; and in the same region of temperature the ratio of its specific heat at constant pressure to the specific heat at constant volume is about 1.294. Iodine shows an important change in its vapor density at high temperatures. Thus, below about 1,200° F. the vapor has a density about 126 times as great as that of hydrogen under the same conditions of temperature and pressure; but as the temperature rises the density of the vapor, relatively to hydrogen, falls off, until it is only about 68 at 2,700° F. It is believed that this change in density indicates that the molecules of iodine vapor split in two as the temperature rises; a molecule, just above the boiling point, containing two atoms, while at the higher temperature the molecules are monatomic. Iodine is freely soluble in alcohol, ether, carbon disulphide, chloroform and glycerin. It is only slightly soluble in pure water, but dissolves readily in aqueous solutions of the iodides. It is also soluble in benzine, acetic acid and numerous other organic fluids. Iodine is a non-conductor of electricity.

With hydrogen, iodine forms the important compound HI, known as hydriodic acid. (See HYDRIODIC ACID). With the metals it forms binary compounds called "iodides," which may also be regarded as salts of hydriodic acid. Of these the most important is potassium iodide, KI, which is largely used in medicine. It is prepared by dissolving iodine in a solution of caustic potash, evaporating to dryness and igniting. This salt is very soluble and crystallizes in cubes. The iodides of ammonium, sodium, strontium and zinc are also used to a more limited extent. Iodoform, a yellow crystalline powder with a peculiar characteristic odor when warmed, is also much used as a dressing in surgery. It has the formula CHI_3, and is analogous in its chemical structure and deportment to chloroform. Iodoform may be prepared by dissolving iodine in an alcoholic solution of caustic potash, the iodoform that is produced separating out as a precipitate. It is also prepared in Germany, to a certain extent, by the electrolysis of a similar solution. (Consult Löb, 'Electrolysis and Electrosynthesis of Organic Compounds'). Iodine and its compounds are used to some extent in photography, and to a larger extent in synthetic chemistry, for the preparation of the coal-tar colors (q.v.), and other organic substances.

Iodine forms two important oxy-acids, known respectively as iodic acid, HIO_3, and

periodic acid, HIO_4+2H_2O. These are analogous, in their chemical deportment, to chloric and perchloric acids. It also forms the interesting chlorides IO and ICl_3.

Free iodine combines with starch to form a remarkable deep blue compound, whose production is a well-known test for the presence, in a given substance, of either starch or free iodine. To detect the presence of iodine in a solution, a few drops of thin, clear starch paste are added to the solution to be tested (which should be cold), and hydrochloric acid is added until the reaction is acid. A couple of drops of a concentrated solution of potassium nitrite are then added, when the dark blue color of iodide of starch will instantly be produced, if iodine is present. This test may readily be modified so as to serve for the detection of starch. The reaction is not given by dextrin, nor by other isomers of starch.

Iodine is used medically in a compound solution with KI, in alcoholic solution or as a component in an ointment. These preparations are valuable counterirritants and antiseptics. A preparation of iodine and wood tar is used in ringworm. See HYDRIODIC ACID; IODINE IN MEDICINE.

IODINE AND IODIDES IN MEDICINE. Iodine and its iodides — especially those of sodium and potassium — have been used in medicine since the Chinese are supposed to have introduced them, 2000 B.C. or earlier. The exact method of action of the iodides is not clear, but it would seem that iodine, being a normal constituent of the human body, is a very essential element in normal metabolism. It is found in comparatively large quantities in the thyroid gland, which is known to exercise a very important action in the general body-metabolism, and it is probably by means of the stimulation of the general metabolism of the body that the iodides manifest their beneficial action. The iodides are freely absorbed from watery solutions by mucous membranes throughout the body, particularly in the stomach and intestine. They are taken up into the blood, pass through the tissues, stimulating the lymph-flow, and are excreted in the urine in the form of salts. The iodides are likely to irritate the digestive system. Iodine itself possesses a local irritant action. It is soon converted into the iodides when taken internally, and causes similar internal changes.

When the iodides are taken in large doses, or even in small doses for a long time, a form of chronic poisoning known as iodism results. In this the chief symptoms, found in the air-passages, consist of a catarrh, especially of the nose, with profuse watery secretion, sneezing and sometimes bronchitis. There is usually swelling and irritation of the throat and tonsils, and salivation. Nausea and gastric discomforts are common, and skin-eruptions are frequent. There is usually loss of weight, and if the iodide has been taken for a very long period a condition of cachexia, characterized by a great loss of flesh, weakness, depression and restlessness, may result. The chief use of the iodides in medicine is in the treatment of tertiary syphilis, on which it has a specific effect. It is also useful in actinomycosis, metal poisoning, high arterial tension, arteriosclerosis, aortic aneurism, colloid goitre and rheumatic affections. It is also very useful in the various joint-pains of a chronic character, usually known as chronic rheumatism. Iodine is valuable in the treatment of those diseases known to result from thyroid insufficiency, notably in myxœdema (q.v.), and in cretinism, its allied form in children. For stimulation of the respiratory and nasal passages, as in chronic bronchitis, asthma and dry nasal catarrh, the iodides are of great value.

IODOFORM. Tri-iodomethane, CHI_3, was discovered by Serullas in 1822. It is formed by the interaction of ethyl alcohol and iodine in the presence of caustic alkalis. Acetone, acetaldehyde and many other compounds may also yield varying quantities of iodoform when treated with iodine and caustic alkalis or carbonates. Iodoform has also been obtained from derivatives of acetylene; and of late years it has been formed from ammonium iodide in the presence of potassium hypoiodite, potassium carbonate and ammonia.

On a commercial scale iodoform is prepared by the addition of iodine to an aqueous solution of sodium carbonate in the presence of ethyl alcohol. The temperature of the reaction mixture is maintained at 70°–80° C. The main portion of the iodine is converted into iodoform, which being insoluble forms a yellow precipitate. The remainder of the iodine dissolves in the reaction mixture as sodium iodide. From the latter the iodine is recovered by the use of chlorine, and converted into iodoform with an additional quantity of sodium carbonate and alcohol. A repetition of this process will increase the yield of iodoform. In this method acetone may be substituted for ethyl alcohol, and potassium carbonate for sodium carbonate.

A second process, extensively employed at the present time, consists in the electrolysis of a water solution of potassium iodide, alcohol or acetone, and an alkaline hydroxide or carbonate, at a temperature of 65° C.

Iodoform crystallizes in lemon-yellow plates. It has a persistent unpleasant odor, melts at 119° C. and dissolves in absolute alcohol, ether, carbon bisulphide and other solvents. With alcoholic potash it yields potassium formate and potassium iodide. In the presence of arsenious acid and sodium hydroxide it is converted into methylene iodide, and with phosphorus pentachloride it yields chloroform. With dry silver nitrate iodoform forms an explosive mixture.

Iodoform was first employed in the treatment of wounds in 1880. When brought in contact with wounds or sores it acts as a good antiseptic and promotes healing. The action is probably due to the liberation of iodine and other products at the temperature of the body. It is extensively used in the treatment of scrofula, goitre, cancer and in syphilitic and tuberculous ulcerations. When iodoform is taken in large doses into the system, it may produce symptoms of poisoning, nausea and vomiting, headache, sleepiness, hallucinations and even death.

The objectionable odor of iodoform has been masked by combining it with a variety of substances such as volatile oil of camphor, balsam of Peru and paraformaldehyde. A number of good iodoform substitutes have been prepared. Some of these are related to iodoform both in composition and in their mode of

decomposition. Iodoformin, for example, is a compound of iodoform and hexamethylene tetramine; it liberates iodoform when it is used as a dressing on wounds. Iodol (tetra-iodo-pyrrol), and aristol (dithymol di-iodide) are also more or less related to iodoform. Among other substitutes for iodoform may be mentioned europhen, vioform, xeroform, noviform, loretin and airol.

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IODYRITE. A native iodide of silver AgI, with 46 per cent of silver. Occurs in Lincoln and Mineral counties, Utah, and at Lake Valley, New Mexico.

IOLA, ī-ō'la, Kan., city and county-seat of Allen County, on the left bank of the Neosho River, about 40 miles west of the Missouri line and about 100 miles south of Kansas City. The town is reached by the Atchison, Topeka and Santa Fé, the Missouri, Kansas and Texas and the Missouri Pacific railroads. It was laid out by the Iola Town Company in 1859. In 1865 it became the county-seat of the county, and grew steadily, although slowly. In 1896 natural gas was discovered on the town site, and the town began to grow rapidly, with the location in and near Iola of nine large zinc smelters, a number of brick factories, two Portland cement plants and other manufacturing enterprises attracted to the place by the cheap fuel which the large field of natural gas supplied. The leading church denominations are the Presbyterian, Methodist Episcopal, Christian, Baptist, Episcopal, Reformed and Catholic. The city is well supplied with schools, its high school being one of the best in the State. There are two daily papers, the *Record* and the *Register*. The city is surrounded by a well-settled and prosperous agricultural community, but the chief business is derived from the manufacturing industries. The population is almost wholly American, the exceptions being a few Poles and Swedes employed in the manufacturing plants. An electric road connects Iola with a number of suburban towns, increasing the population to 14,000.

IOLITE, a mineral, the formula of which is $Mg_2Al_4Si_5O_{18}$. It crystallizes in the orthorhombic system, in the form of short columns of a hexagonal tendency. It is blue but shows different tints under different lights, and consequently known as dichroite. Its hardness is 7–7.5, its specific gravity 2.6. Some of the aluminium may be replaced by iron. Since water is found on the analysis of fresh specimens, the formula is sometimes written $H_2Mg_4Al_3Si_5O_{17}$. It is an essential component of many gneisses, and is found in Bavaria, Finland, Connecticut, Ceylon and Spain. Deep blue specimens are known as lynx sapphire; light blue ones may be known as saphir d'eau or water sapphire.

ION OF CHIOS, Greek author: b. about 500; d. about 422 B.C. In 478 he came to Athens where he made the acquaintance of the leading men of the time including Cimon, Pericles, Æschylus and probably Sophocles. He is the author of 'Επιδημίαι,' a volume of which we possess but a few fragments. It was used extensively by later Greek historians. He also wrote tragedies, lyrics and other verse. Consult Müller, 'Fragmenta Historicorum Græcorum' (1853); Allègre, 'De Ione Chio' (Lyons 1890); Nauck, 'Tragicorum Græcorum Fragmenta' (Leipzig 1889) and Christ-Schmidt, 'Geschichte der griechischen Litteratur' (Vol. I, 5th ed., Munich 1908).

IONA, or ICOLMKILL, Scotland, an island on the west coast, one of the Inner Hebrides, in the county of Argyle. Iona is about three miles long by one and one-half miles broad; area, 2,000 acres, of which 600 acres are under cultivation, the remainder being hill pasture, morass and rock. The island is celebrated for its history and its ancient ruins, and epecially from its connection with Saint Columbia, who took up his residence here after the middle of the 6th century (565). The existing ruins are all, however, of a much more recent date. Forty-eight kings of Scotland, four kings of Ireland and eight kings of Norway are said to have been buried on Iona Island, among them being King Duncan, made famous by Shakespeare. About 1900 the Duke of Argyle conveyed the entire island to the Church of Scotland under certain conditions of preservation and restoration.

IONE, i'on, Cal., village in Amador County, on the Southern Pacific, 40 miles southeast of Sacramento. The surrounding region is well adapted to agriculture and has extensive coal deposits. The village is the seat of the Preston School of Industry. Its industrial establishments are limited to flouring mills and a creamery. Pop. 1,550.

IONIA, ī-ō'nĭa, Asia Minor, that part of the seaboard which was inhabited by Ionian Greeks, a beautiful and fertile country opposite the islands of Samos and Chios, which also belonged to it. According to tradition, the Greek colonists came over from Attica about 1050 B.C., and founded 12 towns, which, though mutually independent, formed a confederacy for common purposes. These included Phocæa, Ephesus, Miletus, etc., and latterly Smyrna. Commerce, navigation and agriculture early rendered them wealthy and flourishing, but the country was made tributary by Crœsus, king of Lydia, and later by Cyrus, king of Persia (557 B.C.). With an interval of independence they remained under Persia until this empire was overthrown by Alexander the Great, 334–331 B.C., when they became a part of the Macedonian Empire. Ionia, at a later period, became part of the Roman province of Asia. It was afterward totally devastated by the Saracens, so that few vestiges of its ancient civilization remain.

IONIA, Mich., city and county-seat of Ionia County, on the Grand River, and the Detroit, G. H. and M., the Pere M. and the Grand Trunk railroads, 34 miles east of Grand Rapids. It contains the State house of correction, the State asylum for the dangerous and criminal insane, large railroad repair shops, and manufactories of pottery, furniture, machinery, edged tools and clothing. The industrial interests are greatly promoted by excellent power furnished by the river. The city has a public high school, library, several daily and weekly periodicals and an assessed property valuation of about $4,500,000. Under the revised charter of 1897, the government is administered by a mayor and city council elected annually. Ionia

was settled in 1833 and incorporated in 1873. Pop. 7,123.

IONIAN ISLANDS, a number of islands belonging to the kingdom of Greece, in the Ionian Sea, off the coast of Albania and the western and southern shores of Greece, the most southern, Cerigo, and its dependent islets being off the southeastern extremity of the Morea. The principal islands, seven in number, are, reckoning from north to south, Kerkyra (Corfu), Paxos, Levkas (Santa Maura), Ithaki (Ithaca), Kephallenia (Cephalonia), Zakynthos (Zante) and Kythira (Cerigo). To each of these larger islands a number of smaller, scattered along their respective coasts, are attached and included in their several local jurisdictions. Area of the whole, 1,117 square miles. Pop. about 226,590. All these islands belong to the great calcareous formation of Greece. They are extremely mountainous, and do not contain enough arable land to produce the corn required by the population; and were it not for the vine, olive and currant, all of which they produce, they could support but a small number of inhabitants. The climate is even more temperate than that of the neighboring mainland. Snow often falls in the winter and lies on the mountains, but rarely on the plains. The staple exports are oil, currants, valonia, wine, soap and salt. The few manufactures are chiefly textile and ornamental. The religion is that of the Eastern Greek Church, to which four-fifths of the population belong. Each island has its own bishop, and at the head of the whole is an exarch or primate. In 1867 a series of disastrous earthquakes took place. The Ionian Islands, so called from lying in that part of the Mediterranean anciently known as the Mare Ionicum or Ionian Sea, often figure in the ancient history of Greece, but only singly, not collectively. In 1809 all the islands were captured by the British troops except Corfu, which did not come into their hands till it was assigned to them by the Peace of Paris in 1814, possession being finally fixed and regulated by another treaty concluded at Paris in 1815. The seven islands were then formed into a republic, under the protectorate of Great Britain. In 1857 a desire was expressed by their representatives for reunion with Greece, and the islands, with the consent of the other European powers, were transferred to the kingdom of Greece in 1864. See GREECE.

IONIAN PHILOSOPHY, early Greek hylozoism and henism of the thinkers of the Ionian School (q.v.). The term hylozoism is apt to be misleading, the term henism to be misunderstood, and we may therefore give them passing notice. First, hylozoism is *not* synonymous with materialism. Materialism is that world-conception which attempts to explain all phenomena from matter and motion, which in a radical form materializes even things immaterial. Not so with hylozoism. To some, of course, it suggests theories which deny the separate reality of life and spirit. And, indeed, in the days of the first Ionian thinker, Thales, and even far later, it cannot be denied that the distinction between matter and spirit had not been keenly felt, still less formulated in such a way that it could be either definitely affirmed or denied. But the uncreated, indestructible reality of which Ionian thought concerns itself was a body, or even matter if we choose to call it matter: but it was *not* matter in the sense in which matter is opposed to spirit. Hylozoism thus is characteristic of any system which explains all life, whether physical or mental, as ultimately derivable and derived from animated matter. Ionian hylozoism consisted chiefly in an inquiry after the first principle or element, regarded as animated, out of which the sense-perceptible world is constructed. Thus Thales, Anaximander, Anaximenes, Heraclitus, Anaxagoras and other Ionian thinkers, on account of their having followed one general tendency, possess, intellectually considered, another common characteristic. In thought they are henistic. By henism is to be understood those philosophic efforts to subsume everything under one general notion, be it motion, or matter, or spirit, or matter in motion, or evolution, or an unknown substratum, like the Kantian "thing-in-itself" and the Spencerian "unknowable." Henism is, briefly, one-notion, single-idea philosophy. All Ionian philosophers asked: From what did the world come? The growing body of thought which may be traced through successive representatives of the Ionian school is always that which concerns a primary substance. The astronomical and other theories are, in the main, peculiar only to the individual thinkers of the school. Greek philosophy thus began as it ended, with the search for what was abiding in the flux of things.

Philosophy arose in Greece as elsewhere in the attempt to discover the *laws* of outward phenomena, and the origin and successive stages of the world's development. The earlier thinkers stand in closer relation to the previous religious or mythical views; they seek to substitute an intelligible hypothesis, based on real things, for the myths of the poets. Even the myths, however, which described the generation of the gods and the origination of worlds, implied, at least, a view of a single connected world-process, and of an inclusion of all in the universe within that process. Sky, earth, sea, days, seasons, in short, all detached phenomena were given unity and relation even in the Greek poets, in such beings as *Gaia* (earth) and *Ouranos* (heaven) and similar deities. Thus, most in touch as were the earlier Ionian thinkers with the Olympian religion, with its deities of the sky and the ocean, their task was to substitute for such personifications actual concrete substances, a work they sought to complete through closer contact with nature. All sought to explain the material universe as given in sensory experience. The chief aim was to secure an answer to the inquiry: What is the one original element, if indeed it is only one, or what are the original elements, if more than one, of which the universe consists? The philosophers found ready to hand in the mythic cycles the conception that the world was *one*. From what did it come? Their answers were usually given in terms of matter, movement and force. Concerned mainly with the ontological or metaphysical problem, the thought of the Ionian thinkers was in its chief characters cosmological. The other problems of the philosopher, epistemological, logical, ethical and æsthetical, receive, when they receive any attention, only passing notice from the Ionians. The characteristic work which distinguishes the

speculations of this school is the endeavor to refer all sensible things back to one original principle in nature. And as their efforts began with a search for laws, so were those efforts rewarded by the earliest conception of what became the most fruitful idea evolved in the whole body of Ionian thought, namely, the notion of "rational law" or *logos*, and "justice" (δικη), which controls a world process and regulates allotted changes. When the regular course of nature was first realized by members of the Ionian School, no better word for it could be found than "δικη." It is the same metaphor which still lives on in our expression "natural law." Here we see the decree of Zeus, the destroyer of the gods, the social and religious law of justice, becoming the central conception for viewing the physical process, an achievement which could not dispose of all those implications, like for example fatalism, which cling to the modern term law even in the science of to-day. A law of changes gave a union of the "one" and the "many" to the thought of some of these early thinkers. All the members of the school were one in method and in aim. The one great principle which underlies all Ionian thought, though it is first put into words by Parmenides, is that "nothing comes into being out of nothing and nothing passes away into nothing." Their acute penetration into the philosophical problem is testified by the fact that they attempted to recover not only the beginning of all things, but the eternal ground of all things for thought. And it is true that important beginnings of a theory of evolution are to be found in the speculations of the earliest Grecian school of philosophy.

"Nothing is born of nothing" (Parmenides of the Eleatic School). From what then did the existing world come? In the history of the Ionian School (q.v.) two principal ways of viewing nature, a dynamical and a mechanical way, present themselves at its very beginning and proceed side by side to its very close. The dynamical theorist proceeds on the supposition of a living energy which in its development spontaneously undergoes continuous alteration both of form and quality and consequently considers all generation in nature as explicable by successive transmutations of energy. The mechanist, on the other hand, rejects all generation in the proper sense of the word and all alteration of the qualities and forms in nature, and accounts for all appearances by certain changes in the outer relations of space. Here a theorist proceeds, therefore, on the assumption of certain permanent material elements, which change place in obedience to motion, either originally inherent or extrinsically impressed; and thus it is a theoretical explanation of the world which if carried out in all its implications will lead to the conclusion that all apparent generation of natural forms and qualities is educed by the various combinations into which material elements of originally distinct forms mutually enter. The two theories rest on views directly opposed to each other. With the exceptions of Anaxagoras, Anaximander and Archelaus, the Ionian hylozoists all show an inclination to adopt the dynamical explanation of the world. By all, excepting the three philosophers named, *nature* is regarded as naively animated, alive, and its successive changes as so many spontaneous developments of life. And by them it was accepted as a principle that a single elementary substance passes through a series of transformations, by means of expansions, condensations and other modifications considered as processes of life. Thus those who admitted one rather than a plurality of elements were obliged to endow it with a principle of vitality to account for existing variety. They thus adopt dynamism, a rather crude form of henism. Archelaus, Anaximander and Anaxagoras, on the contrary, believed in a plurality of elements, two or more, and considered mechanical interaction of these as sufficient to account for the existing state of things. What is the original element, if only one, or, what are the original elements, if more than one, of which the universe consists. Two periods can likewise be distinguished in the development of the reply to this question owing to its reformulation and the manner in which different thinkers in the school approached it. Prior to the advent of Heraclitus attempts were made to find a material substance of which all things consist. What were the materials out of which all things arose and into which they will again return? What is the substratum of things seen? Thales, Anaximenes, Diogenes and other dynamists as well agree in regarding the universe as the result of a single principle, element or power. All sensible things are modifications of this principle, real only in reference to their ultimate ground, a substance of which all things consist. After the time of Heraclitus the question became: How did the sensible world become what it is? Of what nature is the motive force? Here the germs of a more philosophic doctrine is apparent. Heraclitus, indeed, retains the simplicity of an original element, his "fire," but it is apparent that this fire is only a sensible symbol, used only to present more vividly to the mind the idea of an energy of a vital principle, the ground of all outward appearances. He with his principle of universal flux gave thinking a new turn and proceeded to explain everything in terms of force and motion, or dynamic energy. It would indeed be a mistake to regard philosophers of the Ionian school as materialists. They distinguish between law operating in the external world and the apprehension of phenomena; and vaguely also between subjective and objective. But we meet with thinkers of the mechanistic tendency. Anaxagoras and Anaximander agree in this respect, that they consider the world to be made up of numberless small particles of different kinds and various shapes by the change in whose relative position all phenomena are to be accounted for. This hypothesis is combined by Anaxagoras with the Supreme Reason, author of all that is regular and harmonious in the disposition of the particles or elementary atoms. Out of what did the existing world proceed? Thales, the first Ionian philosopher, answered out of water, which Anaximander denied and replied that the ground of all being is the boundless, the infinite or the all-embracing. Pherecydes of Syra believed that the primal substratum of all things was earth; but both Anaximenes and Diogenes contended

that the existing state of things proceeded out of air. Heraclitus said the original element was fire; Anaxagoras, however, that the world came into being through the motor energy of intelligence; while Archelaus, the teacher of Socrates, believed that primordially the elements were two in number, fire and water, sense-perceptible symbols of heat and cold which can be felt but not seen. And to Hermotimus, whose existence, however, some deny, deeming him mythical, others credit the original formulation of the doctrine of the supreme regulative intelligence, an idea which he is said to have taught his pupil Anaxagoras.

Aristotle believed that the view of Thales had its origin in the observation that all that *grows* appears to have its nourishment in moisture and the observation that *germination* seems to owe its existence to the presence of water. Aristotle adds further that Thales maintained the world to be full of gods and that all motion indicated their presence and the presence of souls. Thales believed that behind infinite multiplicity there was unity. This unity he symbolized with water. Anaximander sought for the primal substance of all things; and postulated an entity intermediate between air and fire on one hand; between earth and water on the other. This entity he called the infinite. To him all differences being finite, these differences have emerged out of the infinite. This infinite has been always and will remain throughout all eternity. Change, growth and decay are explained on the principle of compensation. All things proceeded out of the infinite. All will at some time return to it. According to all appearances, Anaximander's "infinite" is equivalent to the "chaos" of other philosophers and of the myths. "Nous," according to him, is the most pure and subtle of all things. It has all knowledge about all things and also infinite power. Anaximander's theory is thus only one step from pure theism. With him the work of the eternal begins with a kind of providence, not with creation. He did not allow that objects had taken their shape through the accidental or through blind fate. They received their form through the agency of a shaping spirit or Nous, infinite, or boundless, self-potent and unmixed with anything else. The infinite always preserved its unity; its parts alone underwent changes. Thus he tells us that there are an infinite number of worlds, a product of infinity, and that corruption proceeds from separation. Anaximenes made the first principle of things to consist in air, an entity considered as infinite, and possessed of perpetual motion. All things proceeded from this air; all are definite and circumscribed; and divine power resided in air and agitated it. Coldness and moisture, heat and motion rendered this substance visible. Likewise they gave air forms, according to the different degrees of condensation. All elements thus proceed from heat and cold. Diogenes contradicted the pluralism of Heraclitus and claimed that all things were at bottom the same, or interaction he claimed would be impossible. The substrate confirming the opinion of Anaximenes, he declared, was air; and gave it out that the attributes of this substrate were infinity, eternity and intelligence. This intelligence alone, according to Diogenes, would produce unaided the orderly arrangement which is observable in nature; and it is likewise the foundation of human mentality, which originates simply by inhalation. Anaxagoras may be considered the first who clearly and broadly distinguished between mind and matter. By isolating reason from all else, by representing it as motor-energy of the Cosmos, in popularizing the terms which suggested personality and will, Anaxagoras gave an impetus to ideas which were the starting point of Aristotelian philosophy in Greece and in Europe at large. Before Anaxagoras no one can be said to have postulated clearly a creative intelligence. In nature this thinker imagined that there are as many kinds of principles as there are species of compound bodies. He was the first to superadd mind to matter, opening his work with the pleasing language: "All things were confused. Then came mind and disposed them in order." Heraclitus felt that charge is the essential fact of experience. That this is, what it is, in virtue of its perpetually changing relations. Fire, symbol of the primary substance, is that out of which all came, into which again all will return. It is a divine, rational process, the harmony which constitutes the universe. Here follows the doctrine of immortality. The individual, like the phenomena of sense, comes out of the infinite and is again merged in it. While we live our souls are dead within us. When we die our souls are restored to life. For then they approach most nearly to perfection when least differentiated from the elemental fire. This is at once the assertion and the denial of self — resembling a fundamental principle in Buddhism. See GREEK PHILOSOPHY; PHILOSOPHY; PHILOSOPHY, HISTORY OF.

IONIAN SCHOOL, at times called also the Ionian Sect, was the oldest among the ancient schools of Greek philosophy. It originated in Asia Minor under Thales of Miletos, about 600 years before the beginning of the Christian era. Diogenes Laërtius places the birth of Thales during the 35th Olympiad, that is, between 640 B.C. and 636 B.C.; and the philosopher died, according to Apollodorus, in his 78th year, but according to Sosicrates, in his 90th year. The other most famous exponents of Ionian thought after the advent of Thales of Miletos were Anaximander of Miletos, Pherecydes of Syra, Anaximenes of Miletos, Heraclitus of Ephesus, Diogenes of Apollonia and Anaxagoras and Hermotinius of Clazomenæ. It is a most interesting fact in the history of Greek thought that its birth took place not in Greece but in its colonies on the eastern shores of the Ægean Sea. The first name in the list, not alone of Ionian, but indeed of European, thought, is Thales. From Asia Minor the *spirit* of Ionian philosophy passed into Greece, at first under Anaxagoras, then afterward under Archelaus, the master of Socrates. The interval between Thales and Archelaus amounted to a period of not less than 150 years. Thus Athens, taught from Ionia, became in turn the headquarters of philosophy and the parent of the most celebrated Greek schools. The labors of the Ionian School cleared the way for all those schools which at a later period undertook to explain the physical world and served at once as a model and as a starting point for Leucippus, Democritus, Empedocles, Aristotle

and Epicurus. In truth most of the schools which arose in Greece from the time of Thales to the time of the great thinker Socrates—roughly speaking during the period between 600 B.C. and 400 B.C.—and constituted the first philosophic period, were in some sort so many offshoots of the Ionian School. Pythagoras, born at Samos, became the pupil of Pherecydes; Xenophenes, the founder of the Eleatic School, was a native of the Ionian city of Colophon; Abdera, the birthplace of Leucippus and Democritus and the seat of the school which they founded, was a colony from Phocæa; and besides, Democritus was the pupil of Anaxagoras. In the course of its development, the Ionian School was contemporary with other Greek schools, among which the Abderitan and Eleatic schools and the systems of Empedocles and Pythagoras were the most important.

The Ionian Philosophy (q.v.), notwithstanding the celebrity of its first professors, most of whom are named above, soon failed in classical Grecian schools and in Greece never afterward recovered its ancient reputation and authority. This was owing to the suspicion of impiety under which it lay in Athens; to the early growth of new branches from the Socratic stock; and to the rise and spread and vigor of the Eleatic and the Epicurean mode of thought. Ionian philosophy thus disappeared in antiquity for the first time owing to the dual opposition of sullen, unlearned bigotry and the incissive critique it received at the hands of its more profound rivals, like, for example, the Socratic Philosophy.

History has preserved the record of numerous attempts that have been made to form a rational conception of the whole world of phenomena and to recognize in the universe the action of one sole active force by which matter is penetrated, transformed and animated. These attempts are traced in classical antiquity in those treatises on the *principles of things* which emanated from the Ionian School and in which all the phenomena of nature were subjected to hazardous speculations based upon a small number of observations. By degrees, as the influence of great historical events has favored the development of every branch of science supported by observation, that ardor has cooled which formerly led men to seek the essential nature and connection of things in purely rational principles. In recent times the mathematical portion of natural philosophy has been remarkably and admirably enlarged. The method and the instrument (analysis) have been simultaneously perfected. That which has been acquired by means so different by the ingenious application of atomic suppositions, by the more general and intricate study of phenomena and by the improved construction of new apparatus—is now the common property of mankind.

Thales and the earlier members of the school stand in closer relation to the previous mythic and religious cosmologists than the later members. And they seek to substitute intelligible hypothesis, based on real things or events, for the myths of the poets. The first attempt to disenthrall the philosophic intellect from the all-personifying religious faith and to constitute a method of interpreting nature distinct from the untaught inspiration of inferior minds is to be found in Thales in the 6th century before the Christian era. It is to Thales and to a small number of other independent Greek thinkers that philosophy owes the substitution of an impersonal nature for the personified cosmos, conceived as the proper object of study. The Greek word, φυσις, denoting nature and its derivatives *physics* and *physiology,* unknown in the sense which Thales understood it to Homer and Hesiod, as well as the word *kosmos* to denote the mundane system, first appears in these philosophers' speculations. But it must be allowed that the distinction between personal and impersonal was not strongly felt in antiquity and it is a mistake to lay overmuch stress upon it. It seems rather that the real advance made by the scientific men of Miletos was that they left off telling mere tales. They gave up the hopeless task of describing what was where as yet there was nothing and asked instead what all things really are now. The great epistemological principle which underlies all their thinking, though it is first put into words by Parmenides, is that *nothing comes into being out of nothing and nothing passes away into nothing.* See GREEK PHILOSOPHY; IONIAN PHILOSOPHY.

IONIAN SEA, that part of the Mediterranean Sea communicating with the Adriatic Sea or Gulf of Venice by the Strait of Otranto, and having Greece and part of Albania on the east, Sicily and part of southern Italy on the west. This sea, divided from the Adriatic Sea by a submarine ridge rising in the Strait of Otranto, has a shoal or submarine ridge, already referred to by Strabo, which joins Sicily and Tunis, as the true geological boundary of its basin on the west. Over this shoal the waters of the Mediterranean do not rise much more than 100 fathoms, a narrow flood connecting two divisions of the main sea. Its greatest breadth is between Cape Passero in Sicily and Cape Matapan in the Morea, which is about 400 miles. This waste of water washes all the shores of the Ionian Islands excepting those of Cerigo. From the more elevated spots in one of these historic islands the prospects are magnificent. From the high places in Corfu the view takes in two seas, and in clear weather one may discover the faint line of the Italian coast, near the city of Otranto, more than 70 miles away.

Dry cold winds passing over the snows upon the Albanian hills and those of Greece impart to the islands and the surrounding Ionian Sea a chill more piercing-cold than is common even in regions more to the north. The sirocco of southeast wind blows over the sea and its isles during 126½ days annually.

The deepest points in the whole stretch of the Mediterranean waters have been found to lie beneath the surface of the Ionian Sea. Near its centre, say about 36° N. and 18° W. of Greenwich, soundings reveal 2,170 fathoms of water. Then due south of the land of the Morea there is an abrupt fall, in about 36° N., and the greatest depth beneath the surface of the whole watery surface of the Mediterranean is found to lie. The Gulf of Taranto and Squillace, washing the shores of Italy, and the Gulf of Arta, Patros and Arcadia on the coasts of Greece, are among the more important inlets of the Ionian Sea. And the Gulf of Patros is con-

nected with the waters of the historic Gulf of Lepanto. The ebb and flow of tides so marked at Venice are on the whole little perceptible on the shores of the Ionian Sea. In some places it does not rise an inch.

The origin of the Roman designation, Ionium Mare, is very doubtful. The term is found first in the works of the poet Æschylus, who died 456 B.C., though exactly what meaning he attaches to it cannot be clearly ascertained. By this poet, and the ancients generally, the name is usually derived from the "sore-wasting" wanderings of Io, daughter of Inarchus, the river-god of Argos, and its first king. But it is more probable that the sea obtained its name from the Ionian colonies which settled the island of Cephallenia in the Ionian Sea, along with other islands off the coasts of Greece in the same locality. According to Theopompus, Strabo tells us, the name "Ionian" itself was derived from an ancient chieftain's name, Ionius, a native of ancient Issa, now Lissa, a small island in the Adriatic Sea. Pliny, Mela and Tacitus use the words Ionium Mare. Ptolemy, *Ιονιον πελογος* ; Ovid, Ionium Æquor; Horace, Ionium Sinus,—all words equivalent to Ionian Sea. Herodotus, born 484 B.C., and Thucydides, born 471 B.C., both talk of the Ionian Gulf, which as they describe it can only mean the Adriatic Sea of to-day. Strabo, born 64 B.C., appears to have used Ionian Gulf in the same way. Herodotus also alludes to the Ionian Strait, indicating by that term the modern Strait of Otranto. In course of time a wider but vague and indefinite meaning was attached to Ionian Sea. It is perhaps in the works of Polybius, born 204 B.C., that one meets with these words employed in a way approximating most nearly to modern usage. He employed them, however, in a narrower sense than a modern would, to indicate that part of the Mediterranean Sea extending from the entrance of the Adriatic southward to the Peloponnesus, now the Morea. At a later time Pliny, born 23 A.D., included under the term both the Sicilian and Cretan seas besides the modern Ionian Sea. Later still all these arbitrary divisions of the Mediterranean were merged in the extension of the term "Adriatic" which comprised them all. The modern usage of the term Ionian Sea has already been explained. In its ancient and widest signification Ionium Mare must at one time have been understood to mean not the seas of Sicily and of Crete, but even also the far-away waters of the ancient Icarian Sea, a sheet of water nowadays always considered as a part of the historic Ægean.

In modern times many keels have stirred the dark blue waters of the Ionian Sea. From the island of Malta branch out in many directions different steamship routes. From this island one may embark for Brindisi, Patros, Constantinople, Beyrout, Port Said, Alexandria and Bengazi—all of which ship-lines pass over the Ionian Sea. The route from Naples to Athens involves a passage over it. The trip from Athens to Tripoli includes it. And the voyage from Port Said to Brindisi runs through it. Cable lines dropping down into its greatest depths likewise connect its shores. The main among these begin at Malta and unite that island with Zante, Athens, Alexandria and Tripoli.

IONIC DIALECT. See GREEK LANGUAGE.

IONIC ORDER, a style of architecture, so named from the district of Ionia, in ancient Greece, where it originated. Its most marked difference from other orders is seen in the capital of the column, in which spiral ornaments or volutes predominate. From the Doric it also differs in providing a base for the column. A dentil band on the cornice is also proper to the Ionic, in which it was first employed. These Ionic peculiarities appear to be of Eastern origin, probably Assyrian, as is indicated by the employment of the honeysuckle ornament so frequently met with there. Excellent examples of this style are the temple of Fortune at Rome, that of Minerva Polias and that of Erechtheus in Athens.

IONIC THEORY, another name for the Arrhenius Electrolytic Dissociation Theory. For further discussion of this theory the reader is referred to the articles on ARRHENIUS; ELECTROLYSIS; SOLUTIONS.

IONIZATION. See ELECTROLYSIS; ELECTRON; SOLUTION.

IONTOPHORESIS. See ELECTROTHERAPEUTICS.

IORGA, yor'ga, **Nicolæ,** Rumanian historian: b. Botoshani, 1871. He received his education at Iashi, Paris, Berlin and Leipzig and became professor of history at the University of Bucharest in 1894. He was elected member of the Rumanian Academy in 1910. He took an active interest in politics and was soon made leader of the National Democrats. His works include 'Philippe de Mezières et la croisade au XIVe siècle' (1896); 'Notes et extraits pour servir à l'histoire des croisades' (1899–1902); 'Geschichte der Rúmänen' (1905); 'History of the Byzantine Empire' (1907); 'Geschichte des Osmanischen Reiches' (5 vols., 1907–13); 'History of Rumanian Literature in the 18th Century' (1901); 'History of Rumanian Literature in the 19th Century' (1902–09).

IOS, ī'ŏs, an island in the Ægean Sea, one of the Cyclades, said to have been the birthplace of Homer. According to the ancients his mother was born here, and the poet's grave was likewise located here. It is situated about 13 miles south of Naxos. The principal occupations are the cultivation of cotton, olives, wine and cattle raising. Pop. about 2,000.

I O U, a written acknowledgment of debt, usually made in this form: "To A. B. I O U Ten Dollars.—C. D. May 12, 1891." In Great Britain when the name of the creditor is stated, such a document is evidence of a debt of the amount stated due to him by the person whose signature it bears. It is not treated as a promissory note, for the reason that it contains no promise to pay. In the absence of the name of the creditor the document is *prima facie* evidence of such a debt being due to the holder of the document. It is not negotiable. The letters I O U are of course used instead of the words "I owe you" on account of the similarity of sound. In the United States it has been declared negotiable by the decisions of some courts, and it can everywhere be sued upon as an account stated without proof of the origin of the debt.

IOWA, ī'o-a («the Hawkeye State»), a north-central State extending from the Mississippi River to the Missouri River, and occupying three and one-sixth degrees of latitude. It is bounded on the north by Minnesota, on the east by Wisconsin and Illinois, on the south by Missouri, and on the west by Nebraska and South Dakota. Area, 56,025 square miles; 550 water; it is 310 miles east and west, and 210 north and south. Capital, Des Moines. Pop. 1910, 2,224,771; 1915, 2,358,066. It is the sixteenth State in order of admission to the Union, following the organization of the original 13 colonies as States.

Topography.— Iowa is a part of the great central plain, and is chiefly undulating prairie, rising in gentle swells from the Mississippi River to a divide running diagonally, from a height of 1,694 feet in the northwest to a slight elevation in the southeast, with a parallel subdivide in the southwest. There are now no swamps and few natural forests. The only rough spots are the sharp bluffs where the rivers have cut their paths through the glacial drift; the only woods, those along the streams — altogether about 7,000 square miles of woodland, with oak, elm, hickory, black walnut, maple, cottonwood, linden, ash, box-elder, pine, cedar, etc. The eastern watershed, two-thirds of the whole State, is drained to the Mississippi by a series of streams, nearly all of which are parallel and have a southeastward course. The western part is drained to the Missouri by shorter and swifter rivers, flowing first southwest and then south as the Missouri turns eastward. The chief Mississippi affluents are the Upper Iowa, the Turkey, the Maquoketa, the Wapsipinicon, the Iowa and the Cedar (the «main» stream, the Iowa — 375 miles, its «tributary,» the Cedar, 400 miles, the two forming the second largest interior system of the State and joining not far from the mouth of the Iowa), the Checaqua, or Skunk, and lastly the Des Moines with its numerous affluents, far the greatest and commercially the most important as well as the finest scenically, rising in Minnesota and running diagonally across the entire State in a course of 550 miles, with a basin of 14,500 square miles. The State is prolonged by a southeastern corner to include the entire channel of the Des Moines. The northern part of the State has a continuation of the many small, clear, pebbly lakes of Minnesota in glacier-scored pits; some of them — the Walled Lakes — surrounded each by a natural wall of loose stones. The largest are Spirit Lake and the two Okoboji lakes in Dickinson County, and Clear Lake in Cerro Gordo County, all popular summer resorts. West Okoboji, of great depth, lies between wooded hills, and is indented by several picturesque «points» or promontories.

Climate.— The winter climate is somewhat severe because of the location of the State in the midst of a great continent, such severe winters being experienced in all mid-continental climates in middle and northern latitudes. The severity is tempered by freedom from excessive moisture. The State is one of the healthiest in the Union, several of the streams in the northeast having rocky channels, and none having the miasmatic bottom-lands found farther south. The dry, pure air of its rolling prairies affords a valued sanatorium for consumptives. The average annual temperature is 47.4°. The average monthly temperature ranges from 18° in January to 74° in July. The absolute range of temperature during the 26 years of record — 1890 to 1915, inclusive — is 160°, the highest being 113°, in July, 1901, and the lowest 47° below zero, in January 1912. The average precipitation, rain and melted snow, is 31.97 inches, of which 80 per cent falls during the seven months, April to October, inclusive, and more than 52 per cent of the annual amount falls during the critical crop months, May to August, inclusive.

Geology.— No less than five separate sheets of glacial drift cover the State, giving a remarkable variety of productive soil, as well as clays for industrial purposes. The underlying rocks are inclined from northeast to southwest over the greater part of the State, and many of them outcrop in the eastern part of the State in lines which extend from northwest to southeast. The oldest formation is the Sioux Quartzite, which is exposed in the northwestern corner. In the eastern and southern parts of the State from northeast to southwest are found Cambrian, Ordovician, Silurian, Devonian and Carboniferous in succession. Cretaceous deposits overlie the older formations generally through the northwest part. The most valuable mineral beds are the fields of bituminous coal which cover about one-fourth of the entire area of the State and which yielded in the year 1917 9,049,806 tons, valued at $21,096,408; employing 15,464 persons. It is the leading coal State west of the Mississippi except Colorado, and coal is a great factor in all the northwestern industries. Its limestone, a fine grade of building stone, near Marshalltown, Anamosa and other points, was quarried to the extent of $610,534 in 1916. Its gypsum, from the rocky hills in the vicinity of Fort Dodge, is the basis of a fast increasing manufacture of stucco, hard wall plaster and paint. The output of gypsum in 1917 was worth $1,811,432. Iowa also has high grade clays for pottery, fire and building brick, sewer pipe and drain tile. The State ranks seventh in the United States in the value of its clay products. Its output of clay products in 1916 amounted to $7,375,716. Considerable mineral water also is consumed, that from the Colfax Springs being in the lead. The total number of gallons in 1916 was 148,732. Iowa's output of sand and gravel in 1916 amounted to $980,272. The output of cement in 1917 realized $6,870,863. The value of the total mineral production for 1916 was $29,158,908.

Agriculture.— Iowa is unsurpassed in the quality and extent of cultivated land. It presents mainly a friable black loam on the top, from one to five feet deep; is easily worked, is in the main free from stumps and stones, and requires little commercial fertilizer. It has three main varieties, the principal being the alluvial mud of the river bottoms, the glacial drift of the prairies, covering most of the State, a sand and clay loam, and the loess, a rich yellow deposit containing much carbonate of lime, found at great depth on the Missouri slope and along the streams in the central and eastern portions. There is now almost no waste land in the State. In 1915 the number of acres included in farms was 32,951,056 — a decrease

IOWA.

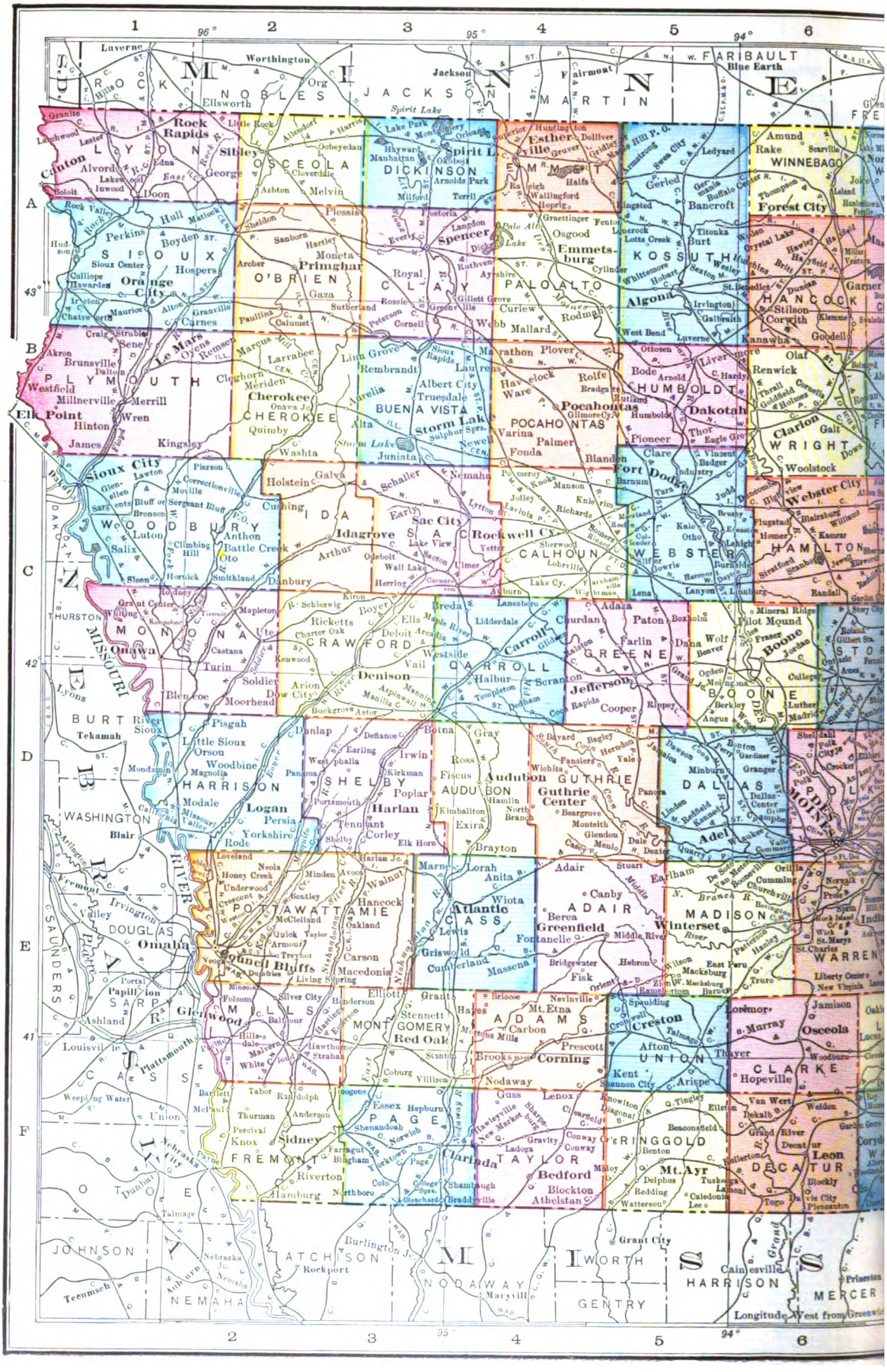
Estimated population, 2,220,321

COUNTIES

Pop.		
14,736	Adair	E 5
11,131	Adams	E 4
17,298	Allamakee	A 11
30,548	Appanoose	F 5
12,590	Audubon	D 4
24,591	Benton	C 9
53,469	Blackhawk	C 9
20,806	Boone	C 6
16,968	Bremer	B 9
18,233	Buchanan	C 10
17,213	Buena Vista	B 3
18,014	Butler	B 8
17,508	Calhoun	C 4
20,997	Carroll	C 4
19,787	Cass	E 4
17,823	Cedar	D 11
31,734	Cerro Gordo	A 7
16,591	Cherokee	B 2
16,089	Chickasaw	A 9
11,028	Clarke	F 6
14,656	Clay	A 3
25,129	Clayton	B 11
45,830	Clinton	D 12
29,361	Crawford	C 3
25,610	Dallas	D 5
13,177	Davis	F 9
17,145	Decatur	F 6
18,564	Delaware	C 11
25,656	Des Moines	F 11
9,465	Dickinson	A 3
60,975	Dubuque	C 12
11,360	Emmet	A 4
29,257	Fayette	B 10
18,213	Floyd	A 8
15,841	Franklin	B 7
18,067	Fremont	F 2
16,339	Greene	C 5
14,051	Grundy	C 8
18,416	Guthrie	D 4
20,514	Hamilton	C 6
17,886	Hancock	A 6
22,484	Hardin	C 7
24,327	Harrison	D 2
17,807	Henry	F 10
13,929	Howard	A 9
13,013	Humboldt	B 5
11,656	Ida	C 2
18,666	Iowa	D 9
20,604	Jackson	C 12
27,496	Jasper	D 7
16,922	Jefferson	E 10
27,330	Johnson	D 11
19,143	Jones	C 10
21,225	Keokuk	E 9
24,200	Kossuth	A 5
38,101	Lee	F 11
70,153	Linn	C 10
12,912	Louisa	E 11
15,120	Lucas	E 7
15,362	Lyon	A 1
15,394	Madison	E 5
29,314	Mahaska	E 8
24,972	Marion	E 7
32,994	Marshall	C 7
14,916	Mills	E 2
14,435	Mitchell	A 8
17,387	Monona	C 2
25,806	Monroe	F 8
17,297	Montgomery	E 3
28,663	Muscatine	E 11
18,582	O'Brien	A 2
10,169	Osceola	A 2
24,773	Page	F 3
14,965	Palo Alto	A 4
23,767	Plymouth	B 1
15,635	Pocahontas	B 4
129,121	Polk	D 6
56,896	Pottawattamie	E 2
19,935	Poweshiek	D 8
13,290	Ringgold	F 5
17,039	Sac	C 3
65,645	Scott	D 12
16,692	Shelby	D 3
25,340	Sioux	A 1
25,787	Story	C 6
22,806	Tama	C 8
16,549	Taylor	F 4
17,168	Union	F 5
14,907	Van Buren	F 10
37,980	Wapello	F 9
18,277	Warren	E 6
20,004	Washington	E 10
16,243	Wayne	F 7
38,811	Webster	C 5
13,564	Winnebago	A 6
22,283	Winneshiek	A 10
82,315	Woodbury	C 1
11,188	Worth	A 7
19,654	Wright	B 6

Incorporated Cities, Towns, and Villages

1,299	Ackley	B 7
113	Ackworth	E 7
1,011	Adair	E 4
1,425	Adel	D 5
1,007	Afton	E 5
374	Agency	E 9
432	Ainsworth	E 10
1,235	Akron	B 1
417	Albert City	B 3
5,128	Albia	E 8
417	Albion	C 8
160	Alburnett	C 10
906	Alden	B 7
302	Alexander	B 7
3,593	Algona	A 5
1,015	Allerton	F 7
535	Allison	B 8
1,078	Alta	B 3
364	Alta Vista	A 8
908	Alton	B 1
520	Altoona	D 7
363	Alvord	A 1
5,091	Ames	C 6
2,822	Anamosa	C 11
68	Andover	D 13
332	Andrew	C 12
248	Angus	D 5
1,210	Anita	D 4
326	Ankeny	D 6
758	Anthon	C 2
510	Aplington	B 8
381	Arcadia	C 3
139	Archer	A 2
237	Arion	D 2
127	Arispe	F 5
787	Arlington	B 10
753	Armstrong	A 5
408	Arnolds Park	A 3
259	Arthur	C 2
507	Ashton	E 2
108	Aspinwall	D 3
205	Atalissa	D 11
148	Athelstan	F 4
5,039	Atlantic	E 4
410	Auburn	C 4
2,084	Audubon	D 4
634	Aurelia	B 3
293	Aurora	G 10
94	Avenaria, Dubuque	C 12
1,648	Avoca	E 3
300	Ayrshire	A 4
222	Badger	B 5
466	Bagley	D 5
228	Bailey	A 8
257	Baldwin	C 12
823	Bancroft	A 5
364	Barnes City	E 8
152	Barnum	B 5
132	Bassett	A 8
605	Batavia	E 9
648	Battle Creek	C 2
572	Baxter	D 7
706	Bayard	D 4
499	Beacon	E 8
163	Beaconsfield	F 5
239	Beaman	C 8
137	Beaver	C 5
1,950	Bedford	F 5
3,668	Belle Plaine	D 9
1,736	Bellevue	C 12
1,419	Belmond	B 6
323	Bennett	D 11
213	Benton	F 5
141	Bentonsport	F 10
117	Berkley	D 5
142	Berlin	C 8
110	Bernard	C 12
1,578	Bettendorf	D 12
581	Birmingham	F 10
236	Blairsburg	C 6
364	Blairstown	C 10
333	Blakesburg	F 8
422	Blanchard	F 3
397	Blencoe	D 2
649	Blockton	F 4
2,283	Bloomfield	F 9
227	Blue Grass	D 12
428	Bode	B 5
643	Bonaparte	F 10
302	Bondurant	D 7
11,185	Boone	C 6
204	Boutonville	D 6
225	Bouton's Mill	C 5
314	Boyden	A 2
326	Braddyville	F 3
207	Bradgate	B 5
349	Brandon	C 10
197	Brayton	D 4
413	Breda	C 4
362	Bridgewater	E 4
1,023	Brighton	F 10
338	Bristow	B 8
1,445	Britt	A 6
1,485	Brooklyn	D 9
111	Brunsville	B 1
193	Buck Grove	C 7
92	Buckgrove	D 3
493	Buffalo	E 12
908	Buffalo Center	A 5
25,030	Burlington	F 11
624	Burt	A 8
655	Bussey	E 8
393	Calamus	D 12
398	Callender	C 5
952	Calmar	A 10
208	Calumet	B 2
617	Camanche	D 13
643	Cambridge	D 7
458	Cantril	F 9
304	Carbon	E 4
633	Carlisle	E 6
144	Carpenter	A 7
4,031	Carroll	C 4
656	Carson	E 2
1,310	Cascade	C 12
801	Casey	D 4
262	Castalia	A 10
441	Castana	C 2
6,284	Cedar Falls	C 8
37,308	Cedar Rapids	D 10
232	Center Junction	C 11
910	Center Point	C 10
7,803	Centerville	F 8
735	Central City	C 11
98	Centralia, Dubuque	C 12
5,235	Charlton	F 7
6,374	Charles City	A 8
334	Charlotte	D 12
739	Charter Oak	C 2
135	Chatsworth	B 1
562	Chelsea	D 9
4,704	Cherokee	B 2
293	Chester	A 9
193	Chillicothe	E 9
634	Churdan	C 4
1,629	Cincinnati	F 7
284	Clare	B 5
671	Clarence	D 11
4,478	Clarinda	F 4
2,553	Clarion	B 6
915	Clarksville	B 8
141	Clayton	B 11
615	Clearfield	F 4
2,241	Clear Lake	A 7
240	Cleghorn	B 2
215	Cleghorn	C 7
714	Clermont	B 10
65	Cleveland	F 7
27,386	Clinton	D 13
284	Clio	F 6
211	Cloverhill, Polk	D 6
276	Clutier	C 9
178	Coburg	F 3
569	Coggon	C 11
635	Coin	F 3
329	Colesburg	B 11
2,607	Colfax	D 7
585	College Springs	F 3
366	Collins	D 7
536	Colo	D 7
390	Columbus City	E 11
1,107	Columbus Jct	E 11
332	Conesville	E 11
620	Conrad	C 8
277	Conway	F 4
1,218	Coon Rapids	D 4
111	Coppock	E 10
148	Coralville, Johnson	D 10
1,884	Corning	F 4
1,056	Correctionville	D 2
577	Corwith	B 6
1,757	Corydon	F 7
134	Cotter	E 10
307	Coulter	B 7
31,484	Council Bluffs	E 2
135	Craig	B 1
323	Crawfordsville	E 10
3,199	Cresco	A 9
7,572	Creston	E 5
179	Cromwell	E 8
177	Crystal Lake	A 6
574	Cumberland	B 4
173	Curlew	B 4
286	Cushing	C 2
161	Cylinder	A 5
447	Dakotah	B 5
856	Dallas Center	D 6
213	Dana	C 5
578	Danbury	C 2
280	Danville	F 11
48,811	Davenport	D 12
636	Davis City	F 6
306	Dawson	D 5
806	Dayton	C 5
341	Decatur	F 6
4,021	Decorah	A 10
436	Dedham	D 4
516	Deep River	D 9
431	Defiance	D 3
438	Delhi	C 11
553	Delmar	D 12
266	Deloit	C 3
721	Delta	E 9
3,455	Denison	D 3
478	Denver	B 9
323	Derby	F 7
101,598	Des Moines	D 6
298	De Soto	D 5
1,877	Dewitt	D 12
810	Dexter	D 5
492	Diagonal	F 5
231	Dickens	A 4
379	Dike	C 8
219	Dixon	D 12
108	Dolliver	A 4
85	Donahue	D 12
425	Donnellson	F 10
612	Doon	A 1
242	Dougherty	B 8
571	Dow City	D 2
1,001	Dows	B 8
2,273	Drakesville	F 8
39,873	Dubuque	C 12
582	Dumont	B 7
476	Duncombe	C 6
300	Dunkerton	B 9
1,393	Dunlap	D 2
50	Durango	B 12
729	Durant	D 12
1,885	Dyersville	C 11
937	Dysart	C 9
4,038	Eagle Grove	B 5
749	Earlham	E 5
347	Earling	D 3
562	Earlville	C 11
534	Early	C 3
300	East Peru	F 6
1,046	Eddyville	E 8
451	Edenville, Marshall	C 7
625	Edgewood	B 11
334	Elberon	D 9
2,030	Eldon	F 9
2,720	Eldora	C 7
236	Eldridge	D 12
611	Elgin	B 10
1,213	Elkader	B 11
527	Elkhorn	D 3
161	Elkhart	D 8
210	Elkport	B 11
558	Elliott	E 3
212	Elliston	F 5
530	Ellsworth	C 6
871	Elma	A 9
182	Ely	D 9
464	Emerson	E 3
2,647	Emmetsburg	A 4
452	Epworth	C 12
797	Essex	F 3
4,123	Estherville	A 4
472	Everly	A 3
842	Exira	B 4
651	Exline	F 8
629	Fairbank	B 10
6,113	Fairfield	F 10
729	Farley	C 11
240	Farmersburg	B 11
1,134	Farmington	F 10
355	Farnhamville	C 5
511	Farragut	F 3
1,175	Fayette	B 10
304	Fenton	A 5
161	Ferguson	D 8
232	Fertile	A 7
253	Floris	F 9
302	Floyd	A 8
1,106	Fonda	B 4
868	Fontanelle	E 4
2,135	Forest City	A 6
305	Fort Atkinson	A 9
538	Fort Des Moines	E 8
20,618	Fort Dodge	B 5
9,507	Fort Madison	F 11
129	Foster	F 8
146	Fostoria	A 3
133	Franklin	F 11
520	Fraser	C 6
635	Fredericksburg	B 9
204	Frederika	B 9
520	Fremont	E 9
185	Galt	B 6
474	Galva	C 3
128	Garber	B 11
741	Garden Grove	F 6
368	Garnavillo	B 11
1,226	Garner	A 6
489	Garrison	C 9
513	Garwin	C 8
205	Geneva	B 7
704	George	A 2
426	Germania	A 5
252	Gilbert	C 6
477	Gilman	D 8
935	Gilmore City	B 4
959	Gladbrook	C 8
3,231	Glenwood	E 2
913	Glidden	C 4
748	Goldfield	B 6
241	Goodell	B 6
113	Goose Lake	D 13
955	Gowrie	C 5
743	Graettinger	A 4
74	Graf	C 12
199	Grafton	A 7
984	Grand Junction	D 5
441	Grand Mound	D 12
313	Grand River	F 6
375	Grandview	E 11
275	Granger	D 6
314	Grant	E 3
177	Grant City	C 4
415	Granville	B 2
540	Gravity	F 4
184	Gray	D 4
370	Greeley	B 11
1,315	Greene	B 8
1,624	Greenfield	E 4
127	Green Island	C 12
351	Grimes	D 6
5,061	Grinnell	D 8
1,148	Griswold	E 3
1,629	Grundy Center	C 8
110	Gruver	A 4
177	Guernsey	D 9
1,678	Guthrie Center	D 4
11,886	Guttenberg	B 11
168	Halbur	D 4
2,204	Hamburg	F 2
398	Hamilton	E 8
3,025	Hampton	B 7
264	Hancock	E 3
186	Hanlontown	A 6
303	Harcourt	C 5
2,825	Harlan	D 3
257	Harper	E 9
315	Harpers Ferry	A 11
308	Harris	A 3
238	Hartford	E 7
1,115	Hartley	A 2
113	Hartwick	D 9
490	Harvey	E 8
432	Hastings	E 3
278	Havelock	B 4
2,045	Hawarden	A 1
614	Hawkeye	B 8
507	Hazleton	B 10
926	Hedrick	E 9
238	Henderson	E 3
112	Hepburn	F 3
210	Hills	D 10
291	Hinton	B 1
152	Holland	C 8
1,137	Holstein	C 2
134	Holy Cross, Dubuque	C 12
91	Hopeville	F 6
836	Hopkinton	C 11
306	Hornick	C 1
557	Hosper	A 2
663	Hubbard	C 7
411	Hudson	C 9
768	Hull	A 1
2,061	Humboldt	B 5
1,054	Humeston	F 7
357	Huxley	D 6
2,090	Ida Grove	C 3
314	Imogene	F 3
3,683	Independence	C 10
3,495	Indianola	E 7
713	Inwood	A 1
291	Iowa	B 9
11,413	Iowa City	D 10
3,716	Iowa Falls	C 7
670	Ireton	B 1
347	Irwin	D 3
151	Jackson Junction	A 10
334	Jamaica	D 5
313	Janesville	B 9
3,103	Jefferson	D 5
789	Jesup	C 10
1,074	Jewell	C 6
172	Joice	A 6
246	Jolley	C 4
514	Kalona	E 10
268	Kamrar	C 6
516	Kanawha	B 6
584	Kellerton	F 6
619	Kellogg	D 8
222	Kelly	D 6
430	Kensett	A 7
166	Kent	F 5
559	Kenwood Park	D 10
15,239	Keokuk	F 11
1,018	Keosauqua	F 9
1,071	Keota	E 10
359	Keswick	E 9
493	Keystone	D 9
350	Kimballton	D 4
1,052	Kingsley	B 1
152	Kinross	E 10
198	Kirkman	D 3
278	Kirkville	E 8
230	Kiron	C 3
404	Klemme	B 6
193	Knierim	C 4
181	Knowlton	F 5
3,541	Knoxville	E 7
526	Lacona	E 7
215	Ladora	D 9
2,224	Lake City	C 4
1,480	Lake Mills	A 7
709	Lake Park	A 3
814	Lakeview	C 3
1,778	Lamoni	F 6
592	Lamont	B 10
298	Lanesboro	C 12
306	Lanesboro	C 4
1,655	Lansing	A 11
1,541	Laporte City	C 9
476	Larchwood	A 1
192	Larrabee	B 2
357	Latimer	B 7
43	Latimer, Dubuque	C 12
194	Laurel	D 8
848	Laurens	B 4
636	Lawler	B 9
190	Lawton	B 1
688	Laylne	D 13
210	Ledyard	A 5
364	Le Grand	D 8
1,290	Lehigh	C 6
129	Leighton	E 8
188	Leland	A 6
5,074	Le Mars	B 1
1,320	Lenox	F 4
2,199	Leon	F 6
221	Le Roy	F 7
274	Lester	A 1
456	Letts	F 11
652	Lewis	E 4
176	Libderdale	C 4
547	Limespring	A 9
324	Linden	D 5
752	Lineville	F 7
320	Linn Grove	B 3
879	Lisbon	D 11
307	Liscomb	C 8
206	Littleport	B 11
634	Little Rock	A 2
452	Little Sioux	D 2
634	Livermore	B 5
203	Locxridge	F 10
1,641	Logan	D 2
636	Lohrville	C 4
818	Lone Tree	E 11
146	Long Grove	D 12
711	Lorimor	E 6
577	Lost Nation	D 12
521	Lovilia	E 8
630	Lowden	D 11
262	Low Moor	D 13
168	Luana	A 11
625	Lucas	E 7
141	Luther	D 6
560	Luverne	B 5
161	Luzerne	D 9
120	Luxemburg	B 12
453	Lynnville	D 8
238	Lytton	C 4
292	McCallsburg	C 7
110	McCausland	D 13
144	McClelland	E 2
1,214	McGregor	B 11
317	McIntire	A 9
390	Macksburg	E 3
304	Macksburg	E 5
1,449	Madrid	D 6
297	Magnolia	D 2
426	Malcom	D 8
384	Mallard	B 4
119	Maloy	F 5
1,254	Malvern	F 2
3,102	Manchester	C 10
1,124	Manilla	D 3
982	Manly	A 7
1,611	Manning	D 3
1,309	Manson	C 4
1,200	Mapleton	C 2
3,776	Maquoketa	C 12
581	Marathon	B 4
535	Marble Rock	B 8
987	Marcus	B 2
2,037	Marengo	D 9
4,675	Marion	D 11
297	Marne	E 3
14,360	Marshalltown	D 7
181	Martelle	D 11
288	Martinsburg	E 9
216	Marysville	E 7
14,457	Mason City	C 7
268	Masonville	C 10
546	Massena	E 4
76	Matlock	A 2
307	Maurice	B 1
856	Maxwell	D 7
426	Maynard	B 10
58	Mayville	E 7
816	Mechanicsville	D 11
867	Mediapolis	F 11
359	Melbourne	D 7
560	Melcher	E 7
469	Melrose	F 7
278	Melvin	A 2
437	Menlo	D 5
263	Meriden	B 2
536	Merrill	B 1
257	Meservey	B 7
421	Meyer	A 8
106	Middletown	F 11
316	Miles	C 13
823	Milford	A 3
197	Millersburg	D 9
607	Milo	E 7
947	Milton	F 9
430	Minburn	D 5
429	Minden	E 3
305	Mingo	D 7
3,764	Missouri Valley	D 2
225	Mitchell	A 8
816	Mitchellville	D 7
406	Modale	D 2
452	Mondamin	B 1
88	Moneta	A 3
224	Monmouth	D 12
966	Monona	B 11
926	Monroe	D 7
1,326	Montezuma	D 9
2,159	Monticello	C 11
413	Montour	D 8
702	Montrose	F 11
381	Moorhead	D 2
157	Moorland	C 5
741	Moravia	F 8
904	Morning Sun	E 11
218	Morrison	C 8
1,352	Moulton	F 8
273	Mt. Auburn	C 9
1,708	Mt. Ayr	F 2
4,089	Mt. Pleasant	F 11
243	Mt. Sterling	F 10
200	Mt. Union	E 11
1,568	Mt. Vernon	D 11
801	Moville	C 2
847	Murray	F 6
17,500	Muscatine	E 11
2,695	Mystic	F 8
1,282	Nashua	B 8
977	Neola	E 2
2,686	Nevada	D 7
613	New Albin	A 11
787	Newell	B 4
248	Newhall	C 9
2,664	New Hampton	A 9
474	New Hartford	B 8
116	New Liberty	D 12
1,162	New London	F 11
737	New Market	F 4
249	New Providence	C 7
1,225	New Sharon	E 8
5,165	Newton	D 8
211	New Vienna	B 11
406	New Virginia	E 6
425	Nichols	E 11
359	Nodaway	F 4
1,148	Nora Springs	A 7
219	Northboro	F 3
164	North Buena Vista, Clayton	B 11
933	North English	D 9
186	North Liberty	D 10
575	North McGregor	A 11


1
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96°
95°
94°
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42
41
A
B
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F
Luverne
Worthington
Jackson
Fairmont
Blue Earth
Granite
Rock Rapids
Little Rock
Spirit Lake
Esther-ville
Amund
Rake
WINNEBAGO
Forest City
Canton
Alvord
Lakewood
Inwood
Doon
Beloit
Sibley
George
Ellsworth
Milford
Terril
Ashton
Melvin
Plessis
Hartley
Sanborn
Moneta
Primghar
Archer
Gaza
Sutherland
Rossie
Cornell
Peterson
Calumet
Paullina
Curlew
Webb
Mallard
Rodman
Ruthven
Ayrshire
Gillett Grove
Greenville
Royal
Spencer
Dickens
Palo Alto
Graettinger
Fenton
Osgood
Emmets-burg
Cylinder
Whittemore
Hobart
Wesley
Sexton
Titonka
Burt
Lotts Creek
Lu-verne
Algona
Irvington
Galbraith
West Bend
Ledyard
Bancroft
Gerled
Germania
Buffalo Center
Swea City
Armstrong
Eagle Hill P.O.
Dolliver
Gruver
Halfa
Wallingford
Hoprig
Raleigh
Lincoln
Thompson
Leland
Joice
Hanlontown
Fenton
Crystal Lake
Hancock
Stilson
Corwith
Klemme
Goodell
Kanawha
Garner
Britt
Hayfield
Hobart
Duncan
Belmond
Clear Lake
Mason City
Plymouth
Akron
Brunsville
Westfield
Millnerville
Merrill
Elk Point
Hinton
Wren
James
Kingsley
Dalton
Le Mars
Oyens
Remsen
Craig
Struble
Sene
Perkins
Hull
Maurice
Orange City
Calliope
Hawarden
Sioux Center
Boyden
Hospers
Alton
Granville
Curnes
Chatsworth
Marcus
Cleghorn
Meriden
Cherokee
Onawa Jct.
CHEROKEE
Quimby
Washta
Larrabee
Linn Grove
Rembrandt
Aurelia
Albert City
Truesdale
BUENA VISTA
Alta
Storm Lake
Sulphur Spgs.
Newell
Marathon
Plover
Laurens
Rolfe
Bradgate
Pocahontas
Gilmore City
POCAHONTAS
Varina
Palmer
Fonda
Havelock
Ware
Rutland
Humboldt
Dakotah
Thor
Eagle Grove
Pioneer
Bode
Arnold
Hardy
HUMBOLDT
Livermore
Renwick
Olaf
Goldfield
Cornelia
Holmes
Thrall
Clarion
Galt
WRIGHT
Woolstock
Dows
Webster City
Hamilton
Blairsburg
Williams
Homer
Kamrar
Jewell
Stanhope
Stratford
Randall
Sioux City
Correctionville
Moville
Sergeant Bluff
Bronson
Luton
Salix
Climbing Hill
Anthon
Battle Creek
Oto
Smithland
Sloan
Hornick
Danbury
Holstein
Galva
Cushing
IDA
Schaller
Nemaha
Early
Lytton
Sac City
Idagrove
Arthur
Odebolt
Wall Lake
Herring
Lake View
Sacton
Ulmer
Rockwell City
Yetter
Sherwood
Lohrville
Lake City
Wightman
Farnhamville
Gowrie
Pomeroy
Knoke
Manson
Jolley
Lavinia
Richards
Knierim
Somers
Rinard
Calhoun
Lanesboro
Otho
Kalo
Lehigh
Duncombe
Clare
Fort Dodge
Barnum
Tara
Judd
Badger
Industry
Vincent
Brushy
Lanyon
Lisbon
Limburg
Lena
Randall
Story City
Roland
Gilbert Sta.
Ontario
Ames
Sioux
Woodbury
Plymouth
Thurston
Monona
Crawford
Carroll
Greene
Boone
Webster
Hamilton
Wright
Hancock
Winnebago
Kossuth
Palo Alto
Emmet
Dickinson
Osceola
Clay
O'Brien
Cherokee
Buena Vista
Pocahontas
Humboldt
Wright
Hancock
Winnebago
Worth
Mitchell
Floyd
Chickasaw
Howard
Winneshiek
Allamakee
Clayton
Fayette
Delaware
Dubuque
Jackson
Clinton
Scott
Muscatine
Louisa
Des Moines
Henry
Lee
Van Buren
Davis
Appanoose
Wapello
Jefferson
Keokuk
Washington
Iowa
Johnson
Cedar
Linn
Jones
Benton
Tama
Marshall
Poweshiek
Iowa
Grundy
Hardin
Franklin
Butler
Bremer
Fayette
Clayton
Allamakee
Winneshiek
Howard
Chickasaw
Floyd
Mitchell
Worth
Cerro Gordo

IOWA
SCALE
Statute Miles, 27=1 Inch.
0 5 10 20 30 40
Rand McNally's New 11 x 14 Map of Iowa.
Copyright by Rand McNally & Co.
MISSISSIPPI RIVER
IOWA RIVER
ILLINOIS
WISCONSIN
MISSOURI
Preston
HOUSTON
Houston
Lyle
Le Roy
Chester
Lime Spring
Burrook
Hesper
New Albin
Dorchester
Sattre
WINNESHIEK
Decorah
Church
Lycurgus
ALLAMAKEE
Waukon
Rossville
Waukon Jc.
Postville
Watson
Elkader
CLAYTON
Guttenberg
Clayton
Garnavillo
Strawberry Point
Elkport
Littleport
St. Olaf
Clermont
Monona
McGregor
Marquette
Lansing
Harpers Ferry
Calmar
Ossian
Frankville
Nordness
Washington Prairie
Ridgeway
Cresco
HOWARD
Acme
Protivin
Elma
Osage
MITCHELL
Mitchell
Orchard
Plymouth
Rock Falls
Floyd
Charles City
CHICKASAW
New Hampton
Ft. Atkinson
Jackson Jc.
Castalia
Elderado Jc.
Lucas
Spillville
Jericho
Saude
Alta Vista
Colwell
Lawler
Waucoma
Lime Creek
Cedar
Floyd Cr
Ernie P.O.
Hanford
Bassett
Rockford
GORDO
FLOYD
Carrville
Nashua
Marble Rock
Powersville
Dougherty
Ionia
Boyd
Alpha
Frederickesburg
Republic
Douglass
Elgin
West Union
Hawkeye
Donnan
Randalia
Fayette
FAYETTE
Brainard
Lima
C. Wadena
Volga
Osborne
Meyerville
Oelwein
Arlington
Maynard
Littleport
Elkport
Strawberry Point
Wood
Graham
Colesburg
Luxemburg
Specht's Ferry
New Vienna
Durango
Dyersville
Peosta
Dubuque
DUBUQUE
Worthington
Cascade
Bernard
St. Donatus
Lamotte
Galena
Galena Jc.
JO DAVIESS
Lancaster
GRANT
Platteville
Calamine
LAFAYETTE
Shullsburg
Mineral Pt.
Aredale
Greene
Packard
Allison
Hampton
Hansell
Sheffield
Clarksville
Tripoli
Horton
Plainfield
Frederika
Sumner
Bremer
Waverly
Denver Jc.
Denver
Janesville
Mona Jc.
Dunkerton
Waterloo
Dewar
Cedar Falls
Normal
Wilson
Hudson
Washburn
Gilbertville
Jubilee
Jeup
Raymond
Shadygrove
Voorhies
Laporte City
Buchanan
Independence
Winthrop
Masonville
Manchester
Delaware
Delhi
Earlville
Ryan
Hopkinton
Ehler
Sandspring
Monti
Quasqueton
Rowley
Brandon
Robinson
Aurora
Edgewood
Dundee
Greeley
Oneida
Almoral
Petersburg
Dyersville
Durango
Dubuque
Graf
Peosta
Farley
Delaware
Fairbank
Hazleton
Littleton
Bryantburg
Lamont
Thorpe
Butler
Shellrock
Kesley
New Hartford
Finchford
Waverly Jc.
Parkersburg
Stout
Benson
Cedar Falls
Fredsville
Cleves
Fern
Wellsburg
Dike
Grundy
Steamboat Rock
Holland
Morrison
Eldora
Hubbard
Grundy Center
Reinbeck
Whitten
Conrad
Union
Bangor
Liscomb
Marshall
Albion
Gladbrook
Tama
Garwin
Green Mountain
Marshalltown
Quarry
Toledo
Dysart
Clutier
Montour
Garrison
Benton
Vinton
Traer
Dinsdale
Buckingham
Mt. Auburn
Berlin
Urbana
Center Point
Rogers
Albumett
Wauseeka
Linn
Tod ville
Robins
Whittier
Palo
Viola
Spring-ville
Sylvia
Anamosa
Jones
Wyoming
Amber
Center Jc.
Scotch Gr.
Onslow
Monticello
Prairieburg
Langworthy
Central City
Troy Mills
Paris
Coggon
Junction
Switch
Stanwood
Lowden
Cedar Bluff
Tipton
Cedar
Clinton
Jackson
Bellevue
Springbrook
Canton
Fulton
Green Island
Iron Hills
Andrew
Hurstville
Maquoketa
Sabula
Sprague ville
Teeds Gr.
Brown
Petersville
Delmar Jc.
Delmar
Charlotte
Welton
Grand mound
Calamus
Dewitt
Malone
Low Moor
Camanche
Buenavista
Big Rock
Dixon
Noel
Long Grove
Princeton
Davenport
Scott
Donahue
Eldridge
Walnut
Pleasant Valley
Durant
Buchanan
Bennett
Oasis
Cedar Valley
Sunbury
Springdale
Plato
West Branch
Morse
Elmira
Tiffin
North Liberty
Solon
Coralville
Iowa River
Iowa City
Johnson
Hills
Downey
West Liberty
Muscatine
Nichols
Sweetland
Pettin
Fairport
Moscow
Stockton
Buffalo
Donahue
Colona
Rock Island
Mississippi Rock
Sherrard
Orion
Cable
Aledo
New Boston
Keithsburg
Mercer
Alpha
Wapello
Louisa
Columbus Jc.
Columbus City
Fredonia
Grandview
Letts
Muscatine
Ardon
Franklandville
Transton
Richmond
Washington
Kalona
Riverside
Wellman
Kinross
Sigourney
Harper
Talleyrand
Hayesville
Tiosa
Delta
Atwood
Keokuk
What Cheer
Webster
Deep River
Millersburg
Williamsburg
English
Iowa
Marengo
Rosota
Ladora
Conroy
Victor
Homestead
Amana
Swisher
Shueyville
Curtis
Coun Falls
Poweshiek
Hartwick
Brooklyn
Jasper
Newton
Murphy
Malcom
Carnforth
Guernsey
Searsboro
Stilwell
Montezuma
Deep River
Tilton
Gibson
Barnes City
Union Ma.
Sharon
Mahaska
Oskaloosa
Rose Hill
Pella
Prairie City
Monroe
Colfax
Mingo
Jasper
Baxter
Ira
Goddard
Grinnell
Malcom
Merz
Ewart
Lynnville
Kellogg
Sully
Liscomb
Rhodes
Ferguson
Gilman
Dunbar
Tama
Chelsea
Toledo
Elberon
Vining
Gladstone
Irving
Belle Plaine
Luzerne
Blairstown
Watkins
Norway
Fairfax
Ely
Walford
Cedar Rapids
Marion
Kenwood Pk.
Beverly
Bertram
Clarence
Lisbon
Mechanicsville
Morley
Martelle
Parnell
Oxford
Oxford Mills
Hilton
Ivanhoe
Lowden
Wheatland
Low Moor
Camanche
Clinton
Grand mound
Calamus
Welton
Charlotte
Delmar Jc.
Delmar
Brown
Petersville
Teeds Gr.
Sabula
Miles
Maquoketa
Sprague ville
Hurstville
Andrew
Iron Hills
Canton
Fulton
Green Island
Springbrook
Bellevue
Jackson
Junction
Switch
Monticello
Prairieburg
Langworthy
Central City
Troy Mills
Paris
Coggon
Scotch Gr.
Center Jc.
Onslow
Amber
Viola
Spring-ville
Sylvia
Anamosa
Jones
Wyoming
Stone City

Pop.		
160	North Tabor, Mills	E 2
123	North Washington	A 8
1,525	Northwood	A 7
359	Norwalk	E 6
443	Norway	D 10
738	Numa	F 8
1,196	Oakland	E 3
416	Oakville	E 11
725	Ocheyedan	A 3
1,238	Odebolt	C 3
7,137	Oelwein	B 10
1,403	Ogden	D 5
163	Olds	E 10
706	Olin	D 11
341	Ollie	E 9
2,210	Onawa	C 1
145	Oneida	B 11
231	Onslow	C 12
1,417	Orange City	A 1
141	Orchard	A 8
496	Orient	E 5
135	Orleans	A 4
2,779	Osage	A 8
2,714	Oscoola	E 6
9,624	Oskaloosa	E 8
853	Ossian	A 10
97	Osterdock	B 11
366	Oto	C 2
153	Ottosen	B 5
24,334	Ottumwa	F 9
577	Oxford	D 10
852	Oxford Junction	D 11
82	Oyens	B 2
660	Pacific Junction	F 2
295	Packwood	E 9
222	Palmer	B 4
222	Palo	C 10
168	Panama	D 2
1,107	Panora	D 5
1,027	Parkersburg	C 8
340	Parnell	D 10
359	Paton	C 5
132	Patterson	E 6
875	Paullina	B 2
3,046	Pella	E 6
5,455	Perry	D 5
382	Persia	D 2
534	Peterson	B 3
499	Pierson	C 2
347	Pilot Mound	C 6
108	Pioneer	B 5
403	Plagah	D 2
325	Plainfield	B 9
245	Pleasanton	F 6
172	Pleasant Plain	E 10
825	Pleasantville	E 7
374	Plymouth	A 7
1,194	Pocahontas	B 4
257	Polk City	D 8
935	Pomeroy	B 4

Pop.		
238	Popejoy	B 7
338	Portsmouth	D 3
1,083	Postville	A 11
227	Prairieburg	C 11
817	Prairie City	D 7
452	Prescott	F 4
654	Preston	C 13
923	Primghar	A 2
428	Princeton	D 13
278	Promise City	F 7
185	Protivin	A 9
456	Pulaski	F 9
466	Quasqueton	C 10
284	Quimby	B 2
77	Quincy, Adams	E 4
729	Radcliffe	C 7
231	Rake	A 6
200	Ralston	C 5
141	Randalia	B 10
320	Randolph	F 2
622	Rathbun	F 8
319	Readlyn	B 9
205	Roasnor	D 7
292	Redding	F 5
868	Redfield	D 5
5,601	Red Oak	E 3
1,257	Reinbeck	C 8
228	Rembrandt	B 3
1,098	Remsen	B 2
483	Renwick	B 6
945	Rieeville	A 9
619	Richland	E 10
95	Rickardsville, Dubuque	C 12
143	Ricketts	C 3
389	Ridgeway	A 10
156	Rinard	C 4
447	Ringsted	A 5
403	Rippey	D 5
656	Riverside	E 10
654	Riverton	F 3
125	Robins	C 10
108	Rock Falls	A 8
1,138	Rockford	B 8
2,031	Rock Rapids	A 1
1,306	Rock Valley	A 1
726	Rockwell	B 7
1,864	Rockwell City	C 4
161	Rodman	B 4
178	Rodney	C 1
901	Roland	C 6
1,115	Rolfe	B 4
183	Rome	F 10
257	Rose Hill	E 9
326	Rowan	B 7
312	Royal	A 3
448	Rudd	A 8
390	Runnells	E 7
660	Russell	F 7
744	Ruthven	A 4
235	Rutland	B 5
483	Ryan	C 11

Pop.		
944	Sabula	C 12
2,521	Sac City	C 3
516	Salem	F 10
339	Salix	C 1
1,456	Sanborn	A 2
110	Sandyville	E 7
162	Scarville	A 6
680	Schaller	C 3
567	Schleswig	C 2
902	Scranton	D 4
207	Searsboro	D 8
507	Sergeant Bluff	C 2
2,146	Seymour	F 7
298	Shambaugh	F 4
289	Shannon City	F 5
166	Sharpsburg	F 4
1,035	Sheffield	B 7
623	Shelby	D 3
220	Sheldahl	D 6
3,323	Sheldon	A 2
829	Shell Rock	B 8
605	Shellsburg	C 10
5,637	Shenandoah	F 3
122	Sherrill, Dubuque	C 12
1,755	Sibley	A 2
1,074	Sidney	F 2
2,109	Sigourney	E 9
483	Silver City	E 2
1,209	Sioux Center	A 1
57,078	Sioux City	B 1
1,023	Sioux Rapids	B 3
670	Slater	D 6
588	Sloan	C 1
333	Smithland	C 2
244	Soldier	D 2
441	Solon	D 11
178	Somers	C 5
333	South English	E 9
4,176	Spencer	A 3
314	Spillville	A 10
1,602	Spirit Lake	A 3
101	Spragueville	C 12
130	Springbrook	C 12
85	Spring Hill	E 6
637	Springville	C 10
852	St. Ansgar	A 8
218	St. Anthony	C 7
455	St. Charles	E 6
146	St. Lucas	B 10
145	St. Olaf	B 11
62	St. Paul, Lee	F 11
696	Stacyville	A 8
357	Stanhope	C 6
160	Stanley	B 10
705	Stanton	F 3
547	Stanwood	D 11
1,037	State Center	D 7
414	Steamboat Rock	C 8
362	Stockport	F 10
121	Stockton	D 12
3,158	Storm Lake	B 3
1,576	Story City	C 7

Pop		
147	Stout	C 8
601	Stratford	C 6
1,157	Strawberry Point	B 11
160	Struble	B 1
1,849	Stuart	E 5
346	Sully	D 8
1,585	Sumner	B 9
188	Superior	A 4
812	Sutherland	B 3
207	Swaledale	B 7
271	Swan	E 7
595	Swea City	A 5
1,048	Tabor	F 2
2,621	Tama	D 8
276	Templeton	D 4
452	Terril	A 3
188	Thayer	F 6
565	Thompson	A 6
297	Thor	B 5
221	Thornburg	E 9
311	Thornton	B 7
357	Thurman	F 2
196	Tiffin	D 10
411	Tingley	F 3
2,176	Tipton	D 11
353	Titonka	A 5
1,721	Toledo	C 8
141	Toronto	D 12
1,378	Traer	C 9
205	Treynor	E 2
854	Tripoli	B 9
322	Truro	E 6
202	Turin	D 2
192	Udell	F 8
295	Underwood	E 2
600	Union	C 7
435	University Park	E 8
393	Urbana	C 2
560	Ute	C 2
685	Vail	D 2
92	Valeria	D 7
3,026	Valley Junction	D 6
505	Vanhorn	D 1
472	Van Meter	E 6
469	Van Wert	F 6
245	Varina	B 4
754	Victor	D 9
2,132	Villisca	F 3
183	Vincent	B 5
164	Vining	D 8
3,996	Vinton	C 9
456	Volga City	B 11
279	Wadena	B 10
461	Walcott	D 12
526	Walker	C 10
188	Wallingford	A 4
726	Wall Lake	C 3
1,008	Walnut	F 3
1,532	Wapello	E 11
4,544	Washington	E 10
432	Washta	B 2
35,559	Waterloo	C 9

Pop		
192	Waterville	A 11
449	Wauconda	B 9
354	Waukee	D 6
2,168	Waukon	A 11
3,561	Waverly	B 9
560	Wayland	E 10
185	Webb	B 4
126	Webster	E 9
5,834	Webster City	C 6
289	Weldon	F 6
839	Wellman	E 10
385	Wellsburg	C 8
75	Welton	D 12
466	Wesley	A 5
701	West Bend	B 5
712	West Branch	D 11
1,091	West Burlington	F 11
233	Westchester	F 10
198	Westfield	B 1
266	Westgate	B 9
1,760	West Liberty	D 11
138	West Mitchell	A 8
564	West Point	F 11
401	Westside	C 3
1,773	West Union	B 10
1,805	What Cheer	E 9
558	Wheatland	D 12
642	Whiting	C 1
588	Whittemore	A 5
236	Whitten	C 8
71	Willey, Carroll	C 4
550	Williams	C 6
1,157	Williamsburg	D 9
1,176	Wilton	D 11
1,007	Winfield	E 11
2,860	Winterset	E 5
564	Winthrop	C 10
246	Wiota	E 4
163	Woden	A 8
1,613	Woodbine	D 2
389	Woodburn	F 6
820	Woodward	D 6
337	Woolstock	B 6
327	Worthington	C 11
707	Wyoming	D 11
305	Yale	D 5
132	Yetter	C 4
212	Yorktown	F 3
536	Zearing	C 7
85	Zwingle	C 12

of 277,000 in 10 years, the decrease largely due to growth of cities, suburban residences and parks and a steady increase in the area of timber land. With remarkable fertility and a steady and sufficient rainfall, the State has for many years been first in the Union in value of its products derived exclusively from the soil. The total value of its agricultural products in 1914, exclusive of livestock was $437,225,662, an increase of 76 per cent in 10 years. The total value of its live stock (farm, animals and poultry) in 1914 was $350,621,975, an increase of 76 per cent in 10 years. Its great crop is corn; it varies, in bushels, from 346,577,988 in 1904 to 397,117,376 in 1914, a gain of nearly 50,000,000 bushels in 10 years; value in 1904, $117,688,099, in 1914, $223,680,692. More than a fourth of Iowa's surface is covered with cornfields. Its second crop is oats, with a total in 1904 of 134,150,609 bushels; in 1914, 178,330,591 bushels; its value in 1904, $34,225,390; in 1914, $72,433,992. Its third crop is wheat, in 1904, 5,859,747 bushels; value $4,787,042; in 1914, $132,174,507. Total horses, mules, etc., in 1905, 1,284,251; value $82,817,016; in 1915, 1,464,993; value $135,924,253. Total cattle in 1905, 4,755,041, value $91,019,753; in 1915, 4,188,956, value $140,978,731. Total hogs in 1905, 6,447,630; value $34,464,153; in 1915, 6,683,476; value $57,019,987. Total sheep in 1905, 500,743; value $1,987,364; in 1915, 575,074; value $2,866,848. Total fowls in 1905, 23,471,063; value $8,083,184; in 1915, 28,115,683; value $13,800,363. It will be noted that with 566,085 fewer cattle in 1915 than in 1905, their total value was about $50,000,000

NUMBER AND VALUE LIVE STOCK ON IOWA FARMS, 1 JAN. 1918.

	Number head	Total value
Swine	10,307,000	$249,429,000
Horses	1,583,000	164,632,000
Mules	69,000	8,004,000
Milch cows	1,405,000	107,764,000
Other cattle	2,919,000	139,820,000
Sheep	1,224,000	16,891,000
Total value		$686,540,000

TABULATED CROP SUMMARY 1917.

CROP	Acres	Average yield	Average price	Total yield	Total value
Corn	10,337,700	34.4 Bu.	$1 23	356,677,000	$438,712,710
Oats	5,526,500	40.2 "	64	222,192,500	142,203,200
Spring wheat	580,400	18.2 "	1 99	10,584,600	21,063,354
Winter wheat	197,270	19.9 "	2 02	3,920,810	7,920,036
Barley	340,100	31.3 "	89	10,649,200	9,477,788
Rye	50,040	18.1 "	1 48	905,850	1,340,658
Flax seed	8,687	10.1 "	3 26	87,450	285,087
Timothy seed	156,750	4.3 "	4 27	673,025	2,873,817
Clover seed	23,480	1.5 "	19 74	35,220	695,243
Potatoes	97,210	77.8 "	1 32	7,564,600	9,985,272
Hay (tame)	2,502,620	1.3 tons	19 57	3,357,100	65,697,448
Hay (wild)	491,590	1.2 "	16 00	594,580	9,513,280
Alfalfa	116,040	2.8 "	23 93	329,110	7,875,602
Pastures and grazing (estimated)	.....	.....	.....	.....	90,000,000
Ensilage (estimated)	.....	.....	.....	.....	20,000,000
Sweet corn (estimated)	.....	3.0 tons	15 00	.....	6,000,000
Pop corn (estimated)	18,805	19.5 Bu.	4 16	366,700	1,525,472
Buckwheat (estimated)	16,000	15.3 "	1 70	244,800	416,160
Fruit crop (estimated)	.....	.....	.....	.....	6,000,000
Garden truck (estimated)	.....	.....	.....	.....	8,500,000
Sugar beets for manufacture (estimated)	7,000	10.0 tons	9 00	70,000	630,000
Miscellaneous (estimated)	.....	.....	.....	.....	11,500,000
Total					$862,215,117
Total value of soil products for 1917 was					822,061,291

16,455,265; value $14,733,138; barley, in 1914, 7,463,395; value $4,199,810; rye, in 1914, 1,025,201; value $839,208; and buckwheat, in 1914, 30,355; value $25,971. Iowa's cereals altogether occupy nearly half of its area. It also raises considerable flaxseed. Its hay product in 1914 was 6,337,139 tons; value $50,746,183. Its garden crops are also of great importance. In 1914, potatoes 8,453,843 bushels; value $4,422,438, also 135,247 bushels sweet potatoes; value $93,487. Total vegetables, in bushels, 8,691,571; value $3,898,440. Iowa also has considerable fruit, especially apples; in 1914 the value of its orchard products was $1,149,305, besides $515,113 of small fruits and berries. Iowa's egg product increased from 79,456,462 dozen in 1904 to 120,930,552 in 1914; value in 1904, $10,794,193; in 1914, $20,593,720. Iowa's dairy products increased in value from $30,687,274 in 1904 to $38,779,869 in 1914.

Stock Raising.— Iowa's live stock looms large. In 1905 its total value was $218,447,468; in 1915, $350,621,975, a gain, in 10 years of more than it was 10 years before. The improvement in the breed of cattle in Iowa, with the advance in prices, accounts for the apparent discrepancy.

Manufactures.— The State's fast-growing population and prosperity and its abundant and almost inexhaustible supply of bituminous coal have, together, within the last decade given a rapid impetus to manufacturing. Small factories have enlarged and many new factories have sprung up. Not a few of these are assuming large proportions. Iowa's manufactured products in 1914 aggregated $310,750,000, an increase of 93.5 per cent over the total in 1904, — a gain 16.5 greater than the increase in the value of Iowa soil products during the same periods. During the decade, 1904–14, the wages in Iowa factories have increased 73.5 per cent; the number of employees has increased 27.5 per cent and the number of factories has increased 17.3 per cent. Factories, 5,614; wage-earners, 63,113; total of wages in 1914, $39,860,000. The products of the slaughtering and

the 33 meat-packing establishments in 1914 were valued at $74,289,000, giving employment to 4,430 men, their wages aggregating $2,740,000. The second industry, butter, cheese and condensed milk, numbers 518 establishments, with 2,182 employees, their products valued at $27,606,000. There are 264 foundry and machine shops, employing 5,571 men; their wages aggregating $3,887,000; their products valued at $16,606,000. There are 1,076 printing and publishing establishments, with 4,948 employees, their wages aggregating $3,336,000; their products valued at $15,934,000. There are 227 flour and grist mills, with 790 employees who are paid $486,000 wages; their products valued at $14,337,000. Among the fast-growing industries of Iowa are artificial stone, with 384 plants, employing 809 workmen, and having an output of $2,082,000; button-making, with 81 plants, 2,406 employees and products valued at $3,255,000; men's clothing and shirts, with 22 plants, 954 employees, and products valued at $1,670,000; copper and tin products, with 86 plants, 558 employees and products valued at $2,489,000; gas, illuminating and heating, with 113 plants, 768 employees, and products valued at $4,066,000; pharmaceutical preparations, with 94 plants, 418 employees and products valued at $4,828,000; canning and preserving, with 64 factories, 1,209 employees and an output valued at $3,255,000; agricultural implements, with 34 factories, 1,164 employees, and products valued at $5,216,000. These turn out cultivators, equalizers, harrows, hoes, plows, seeders, drills, harvesters, hay-carriers, hay-forks, horse hay-rakes, manure spreaders, separators, etc. Cedar Rapids has the largest oatmeal mill in the world. Dubuque has the only ship-building plant in the interior. Among the larger cities, Des Moines leads in brick-making, proprietary medicines, book and job printing and binding, and hosiery; Sioux City, Ottumwa, Cedar Rapids and Des Moines in meatpacking; Davenport, Dubuque, Burlington, Des Moines and Ottumwa in foundries and machine works; Dubuque, Council Bluffs, Grinnell and Des Moines in carriages; Burlington, Davenport, Des Moines, Dubuque, Ottumwa, Keokuk and Oskaloosa in cigars; Sioux City, Des Moines, Cedar Rapids, Fort Dodge, Mason City, in flour and other food products; Des Moines, Ottumwa, Grinnell, Newton, Fairfield and Fort Madison in farm and other machinery.

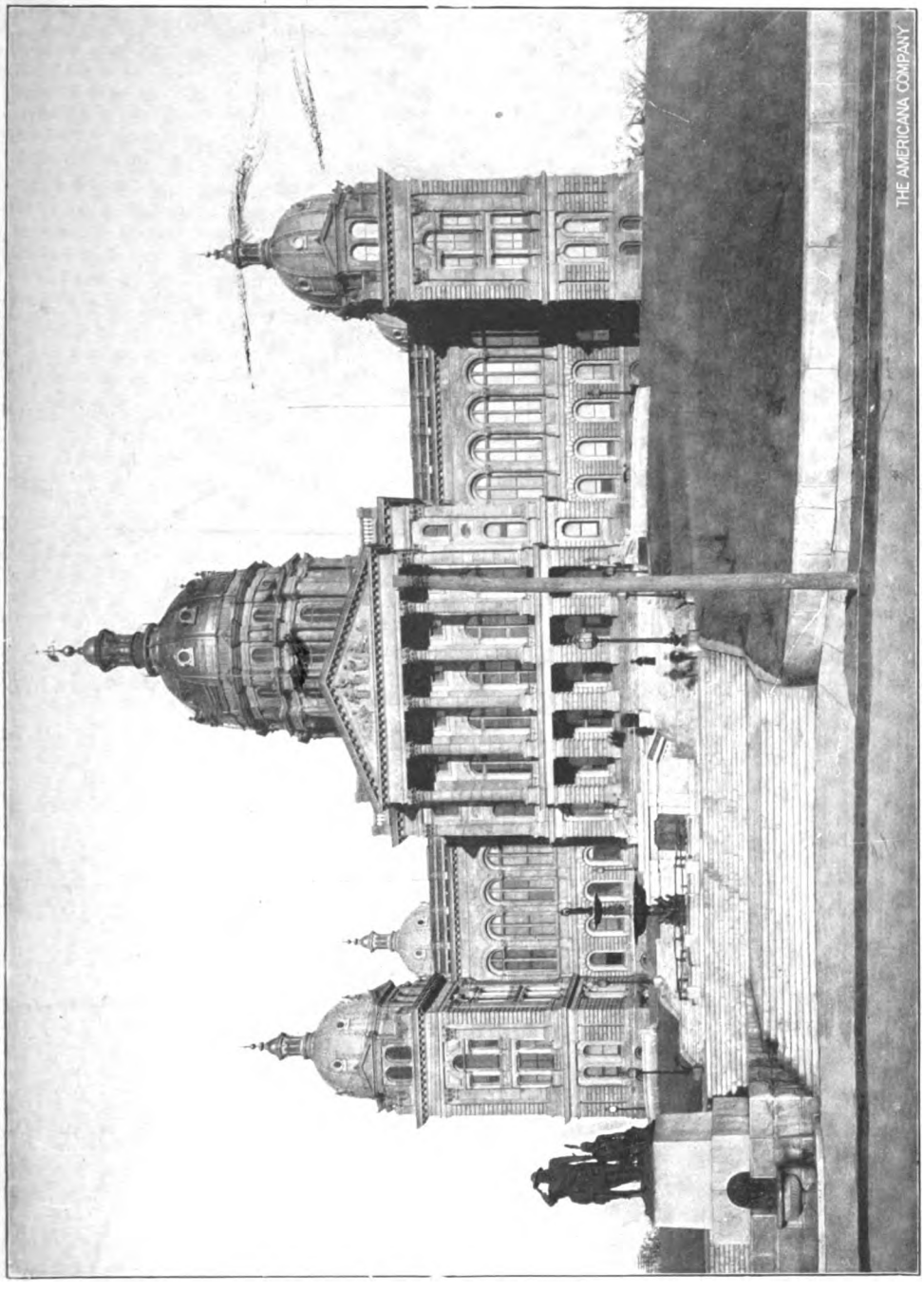
Transportation and Commerce.— Several of the interior rivers are navigable for small boats, the Des Moines for 100 miles, the Missouri for fair-sized steamers its whole length, and the Mississippi for large ones to Saint Paul. But steamers have, in the main, been superseded by railroads; the shifting channel, sand bars and snags of the Missouri make its navigation dangerous and slow. Only the Mississippi remains in practical use. The State, lying in the main path of transcontinental commerce, and originating much well-distributed local traffic, is a vast network of railroads, seven of the great trunk lines crossing it. Every one of the 99 counties has at least one railroad. The farthest distance between railroads at any point in the State is 13.79 miles. Iowa has 10,016 miles of steam railroad and 477 miles of interurban. There is a rapid but steady increase in the mileage on interurbans. The chief cities of interurban lines are Des Moines and Cedar Rapids.

Banking.— Iowa has the largest number of banks of any State in the Union. On 6 July 1915, it had 1,625 banks, national, 348; State, 323; savings, 832; private, 102; loan and trust, 20; total capital, $67,732,586.67; total deposits, $483,521,440.05. In 10 years the savings banks of Iowa have increased in number from 429 to 831; in capital from $13,471,000 to $24,845,100; in deposits from $100,232,071 to $223,975,413; percentage of increase in capital 87, in deposits 123.

State banks have increased in number from 248 to 340; in capital from $10,625,800 to $16,889,700; deposits from $46,261,287 to $101,837,298; percentage of increase in capital 58, in deposits 120. National banks have increased in number from 281 to 348; in capital from $17,665,000 to $23,777,270; in deposits from $69,709,000 to $140,995,227; percentage of increase in capital 34, in deposits 102. Private banks have decreased in number from 139 to 102; in capital from $3,045,166 to $1,893,717; percentage of decrease 37, of deposits 13.

Insurance.— Iowa's insurance corporations are many and extensive, their operations extending to all parts of the Union. While life insurance is the larger interest, fire and casualty companies are growing in number and volume of business. At the beginning of the year 1916 its fire organizations were: stock companies, 4; mutual companies, 3; State mutual associations, 31; county mutual associations, 160. The seven companies show assets amounting to $4,674,867 and net premiums received $2,347,533.64. The 31 State mutual associations show assets, $2,406,510.82; income $1,708,291.61. The 160 county mutual associations show assets $1,502,400.05; income $1,167,718.39. At the beginning of the year 1916, combined assets of Iowa's six casualty companies $2,101,368.43; income $1,173,618.38. At the beginning of the year 1916 there were 14 Iowa companies, 3 Iowa associations and 12 fraternal societies engaged exclusively in life insurance. Of the 14 Iowa life insurance companies, the total assets at the beginning of 1916 was $53,524,298.10; total income $19,148,606.28; of the three associations the total assets at the beginning of 1916 were $3,536,518.80; total income $2,222,531.04. Of the 12 fraternal societies, the total income was $7,439,498.10.

Education.— In 1910 Iowa ranked second among the States in literacy, with 1.7 per cent of illiterates; in 1915 it regained its first place, with only 1 per cent of illiterates. These figures are doubly significant when given in connection with the fact that, by the last Federal census, the average of illiteracy in the United States is 7.7. In 1910 there were 29,889 illiterates in the State; in 1915 there were 18,739. Attendance on common schools in 1915, 76.2 per cent; attendance on high or preparatory schools, 13.6 per cent; attendance at college 6.6 per cent. Total number in attendance in schools and colleges in 1914, 519,814. In 1904–05 Iowa expended on her educational institutions $916,598.71; in 1913–14, $2,682,540.97. Its total of expenditure for schools and colleges in 1914 was $17,585,341.88. Iowa's investment expenditure during the 10 years ending with 1914, for its State Teachers College was $538,616,88; for its State University, $2,081,964.73; for its State College of Agriculture and Mechanic Arts, $2,483,565.42; for school sites and schoolhouses



State Capitol at Des Moines

$11,298,853.20. In 1915, Iowa had 20,946 schools, a gain of 169 since 1906. Since 1906 there has been, along with the increase in schools and expenditures a slight dimunition in the number of teachers. There has been a wide variation in the total enrollment, during the last five years, from 496,045 in 1910 to 522,423 in 1915. In 1915, the total value of Iowa's schoolhouses was $37,061,740; of apparatus $1,915,701; volumes in school libraries, 1,264,291; male teachers 2,628; female teachers 24,163; average school attendance 391,132; teachers' salaries $11,174,715; average compensation of teachers $59.21; average months of school 8.7; percentage of attendance to enrollment 75; schoolhouses built in 1915 232; permanent school fund $4,805,598. The number of graded schools has been steadily increasing since 1870. From 1906 to 1915 the value of Iowa's schoolhouses increased over $14,000,000. In 1915 there were 155 consolidated school districts in the State, the result of a movement toward the township unit begun in 1897,—a movement resulting in the closing of 429 one-room schools. In the fiscal period 1914–16 the State gave a bonus for the encouragement of consolidated schools giving special vocational instruction as follows: for consolidated schools $134,750; for aid in normal training in high schools $238,125. The State provides instruction for its dependents as follows: for the deaf 216, the blind 135, orphan's home 573, industrial school, for girls, 178, for boys 434, for feeble-minded 1,467. There were in Iowa, in 1915, 155 private schools with an enrollment of 23,628. There are 27 colleges and universities unsupported by the State, most of them in part supported by churches. These colleges have land, buildings and equipment valued at over $7,000,000 and have an income of nearly $1,500,000. The combined faculty number 571; students 10,148. The State directly supports three institutions for higher education, under the supervision of a board of education,—which also supervises the college for the blind. These four institutions have property, including endowments, aggregating $12,050,529 as will be seen by the following statement:

* VALUE OF PROPERTY, 1 JULY 1918.

	State University	Iowa State College	Iowa State Teachers College	College for the Blind	School for the Deaf	Total
Real estate	(a) $500,000	(b) $250,000	(c) $25,000	(d) $20,000	(e) $43,000	$838,000
Buildings	2,600,000	2,700,000	1,000,000	300,000	300,000	6,900,000
Residences	25,000	60,000	25,000			110,000
Equipment of departments	800,000	800,000	200,000	10,000	10,000	1,820,000
General equipment	360,000	265,000	50,000	33,000	61,000	769,000
Furniture	150,000	255,000	75,000	3,000	11,000	494,000
Total value of property	$4,435,000	$4,330,000	$1,375,000	$366,000	$425,000	$10,931,000
Permanent Endowment Fund 30 June 1918	275,000	*689,529				964,529
Gifts, etc	155,000					155,000
Total	$4,865,000	$5,019,529	$1,375,000	$366,000	$425,000	$12,050,529

*Approximately correct.
(a) Includes all real estate located in Iowa City and all unsold State University lands, 120 acres, located in various parts of the State. (b) 1,338.88 acres, including campus. (c) 40 acres, including campus. (d) Real estate, 501 acres. (e) Real estate, 212 acres.

They have an annual income, from appropriations, State and Federal, and from interest, tuitions, fees, etc., amounting to over $2,500,000. During the decade closing with 1915, the State invested in land, buildings and equipment for these institutions over $5,000,000. In that decade the faculty in the three institutions for higher education increased from 345 to 692, and the enrollment from 5,694 to 10,127. The record of graduation in 1914–15 was: University (Iowa City) 561; State College (Ames) 413; Teachers' College (Cedar Falls) 385. The student body has increased as follows: University, in 1906, 1,815; in 1915, 2,996; State College in 1906, 1,398; in 1915, 3,629; Teachers College, in 1906, 2,490; in 1915, 3,502. The principal institutions of higher education exclusive of those supported by the State are:

Status in 1915	Professors	Students
Drake University, Des Moines, Disciples of Christ	47	1,061
Highland Park College, Des Moines, Presbyterian	31	994
Cornell College, Mt. Vernon, Methodist	40	683
Grinnell College, Grinnell, Congregationalist	36	664
Simpson College, Indianola, Methodist	30	616
Morningside College, Sioux City, Methodist	25	577
St. Joseph College, Dubuque, Catholic	31	517
Coe College, Cedar Rapids, Presbyterian	21	503
Des Moines College, Des Moines, Baptist	21	470
Wesleyan College, Mt. Pleasant	18	346
Upper Iowa University, Fayette, Methodist	16	246

The beginning of the year 1919 found the principal institutions of higher education in Iowa rapidly recovering from the confusion incident to the brief invasion of the Student Army Training Corps mustered out soon after the amnesty of 11 Nov. 1918.

Libraries.—Iowa had 131 free public libraries in 1916. Eighty-eight of these in as many different cities and towns occupied buildings erected by Andrew Carnegie, and in 1916 eleven others were in process of erection There is only one endowed free public library in the State, the Kendall Young library in Webster City. The State has 31 college and academy libraries, also 14 in State institutions under the board of control, and eight in other State institutions; 50 association and subscription libraries, and four miscellaneous, making a total in the State of 239. The total number of volumes in the public libraries of the State in 1916 was 1,126,073. In the association

libraries, 59,508. In institutional libraries under the board of control, 39,225. In other State institutions 437,647. In colleges and academy libraries, 300,103. Total of volumes in the libraries of the State are 1,962,556.

Churches and Church Membership.— There were in 1915, 4,218 church organizations in Iowa, a gain of 397 in 10 years; membership in 1915, 928,417, a gain of 346,577 in 10 years; value of church property in 1915, $47,717,451, a gain of $22,894,852 in 10 years. The principal denominations show the following membership in 1915: Methodist, 325,959; Catholic, 206,701; Lutherans, 107,523; Disciples of Christ (Christian) 60,720; Presbyterian, 47,059; Baptist, 39,321; Congregationalist, 35,538; United Brethren, 10,366; Latter Day Saints (monogamous) 10,216; United Presbyterian, 9,049; German Evangelical Synod, 8,084; Christian Scientists (estimated) 7,500; Protestant Episcopal, 7,233; Friends, 6,629; Evangelical Association, 5,236. Other denominations: Adventists, Dunkers, United Evangelical, Jews, Mennonite bodies, other Methodist bodies, Reformed bodies (Bohemian, etc), Salvation Army, Unitarians, Universalists, etc.

Charities and Penal Institutions.— Iowa has 17 institutions under a board of control, in which over 10,000 persons are cared for by the State; six for correction and reformation, viz: one penitentiary, two reformatories, two industrial schools, one custodial or convict farm; four hospitals for the insane; one for tuberculosis patients; one for epileptics; one for victims of drugs and intoxicants; one home for soldiers and sailors and their wives; one school for the deaf; one home and school for orphans; one home for the mentally deficient. In 1916 the hospital for epileptics was nearing completion, the custodial farm was in partial use, and the reformatory for women was in process of equipment. The inmates of these 17 institutions increased in number from 8,312 in 1906 to 9,309 in 1914. The cost of maintenance has increased from $1,893,590 — or $179.48 per capita — in 1906 to $4,545,468 — or $400.93 per capita — in 1914. The State has 10,397.05 acres of land in use with these institutions, as against 4,189 acres in 1898 when the board of control assumed their management. The property was then appraised at $8,380,718; its appraised value in 1915 was $12,487,150.44.

State Government.— The constitution was adopted in 1857. By law, the electors must vote once in 10 years on calling a convention to revise the constitution, which convention the legislature must call if so voted. All amendments must receive a majority vote of both houses in two successive legislatures, and then be passed by popular vote. The only amendment to the constitution since 1857 was in 1868, when the word "white" was eliminated. The proposed amendment extending the suffrage to women was voted down 5 June 1916 by a majority of 10,341. An amendment prohibiting the sale of intoxicating liquor as a beverage was carried in 1882 by a majority of 29,759, but was declared invalid by the Supreme Court. An amendment to the same effect was submitted in 1915 and 1917. On 15 Jan. 1919, both houses of the General Assembly — by a vote of 42 to 7 in the Senate and 86 to 13 in the House — passed a joint resolution ratifying the prohibitory amendment to the Constitution of the United States, thus summarily disposing of the question. The Senate has 50 four-year members, the House 108 two-year members; legislative sessions are held biennially in the odd-numbered years. Bills must have a majority of all members elected to both houses — not merely present. A two-thirds vote overcomes the governor's veto. Executive officials are elected for two years — half in one year and half in the alternates, with the exception of the railway commissioners, who are elected for three; the railroad commission has power to regulate rates, etc. The judiciary consists of a Supreme Court, with a chief justice who is such by reason of priority of election, six associate judges, chosen every year; also 53 district judges in 20 districts, each serving four years. Women may vote only on school questions involving the expenditure of money, and on municipal questions involving the issuance of bonds. All incorporated towns of 2,000 people and over are ranked as cities; all platted but unincorporated towns are villages. The number of representatives in Congress is 11. In politics the State has been Republican since the organization of the party, except in the years 1890–94, when the advocacy of prohibition drove it into retirement. The prohibitory amendment, adopted in 1882 and pronounced unconstitutional by the Supreme Court of the State, was succeeded by prohibitory laws which after several years' trial were in turn succeeded by a local option law under which 54 of the 99 counties of the State were reported in 1903 as wholly free from saloons. In 1915 the local option law was repealed, leaving the entire State under a prohibitory law.

Finances.— The finances of the State for the biennial period ending 30 June 1916, show: Balance 1 July 1914, $737,860.82; revenue to 30 June 1916, $15,252,530.36; total, $15,990.391.18. Disbursements, 1 July 1914 to 30 June 1916, $15,172,565.93; balance, 30 June 1916, $717,825.26. All property in Iowa, assessed at actual value, was placed at $2,490,954,700 in 1905; in 1906 it rose to $4,055,607,770. Local taxation is limited to 1 per cent of valuation for current expenses, but this may be exceeded for waterworks, sewers, schools, etc. The State cannot incur a debt of more than $250,000 except for war purposes. Counties and towns cannot incur a debt of over 5 per cent of their actual valuation.

Population and Divisions.— Iowa in 1910 ranked 10th among the States in population. The population was 43,112 in 1840; in 1850, 192,214; in 1860, 674,913; in 1870, 1,194,020; in 1880, 1,624,615; in 1890, 1,911,896; in 1900, 2,231,853; in 1910, 2,224,711; in 1915, 2,358,066. The original population was part of the Free-State movement which peopled the Central States. Of the entire population (1915), 264,169 were foreign-born. Of these 88,450 were from Germany; 64,812 from Scandinavia, or nearly three-fifths from the Teutonic nations; besides several thousands from German Austria and Switzerland. From England 15,681, Canada, 10,980; Ireland, 14,299; Holland, 12,638; Greece, 4,678; Italy, 6,261; Russia, 9,896; China and Japan only 133. Total white population 2,341,322; colored 16,744. In 1915 the census showed an increase in population of 133,289 in five years and 148,010 in 10 years. The capital, Des Moines, on the river of the

same name, is the largest, with 105,652 in 1915, a gain of 30,026 in 10 years. On the same river to the north is Fort Dodge, an old frontier fort and settlement (19,372), and below it Ottumwa (22,437) and Keokuk (15,239). The Mississippi River business is chiefly represented, from north to south, by Dubuque (41,795) the first settled in the State, Clinton (26,091), Davenport (48,483), Muscatine (15,785), Burlington (24,-261), Fort Madison (9,507) and Keokuk (15,-239), the "Gate City," at the mouth of the Des Moines, Sioux City (61,774), in the extreme west, near the mouth of the Big Sioux and Council Bluffs (31,354), opposite Omaha, the old terminus of the Union Pacific, represent the Missouri River; Cedar Rapids (40,667) and Waterloo (33,097), the valley of the Cedar River; and Marshalltown (16,065), the valley of the Iowa River.*

Defense.— The State militia, or National Guard, was organized under a strict military code of the State and in harmony with the United States Army regulations. The governor is commander-in-chief, and directs the guard through the adjutant-general and staff. On 1 Jan. 1916 the guard consisted of staff departments, 6; commander first brigade and staff, 6; medical department, 176; engineer company, 72; first squadron cavalry, 299; first battalion field artillery, 415; first, second and third infantry, 2,465; first separate company, 64. Total, 3,503. In the summer of 1916 the main body of Iowa's National Guard responded to the call of the government for troops on the Mexican border, taking the national oath. In the winter of 1916–17, the Iowa troops returned to their homes but were not mustered out. On 1 March 1917 the First Iowa regiment was called to service in anticipation of the President's declaration of war with the German Empire. On 15 July following, the entire National Guard of the State was called out and sworn into Federal service, under the National Defense Act of that date. These troops rendered valiant service with the American Expeditionary Force in France, and were among the first that turned back the German advance on Paris, and their loss in killed and casualties was extensive. While every able-bodied man between 18 and 45 is subject to call as a member of the State militia, the beginning of the year 1919 found but one regiment of the Iowa National Guard, the Fourth Iowa Infantry, in existence in the State. The troops in actual service on their return were mustered out and restored to their civil status.

History.— The territory now included in Iowa was originally inhabited by the Ioway and Illinois tribes of Indians, which were driven out by the Sacs and Foxes. In 1761 the "Ioway" or Iowa tribes were on the east side of the Missouri River and near the headwaters of the Des Moines; but in 1805 they were occupying land on the south side of the Des Moines River. In 1846 they left the vicinity of the Des Moines, some going to the reservation of the Sacs and Foxes beyond the Missouri. The missionary, Father Marquette, and Joliet, the fur-trader, were the first white men known to have touched foot upon Iowa soil. In 1673 they landed near the mouth of the river now known as the Des Moines. In 1788 a party of 10 white men under Julien Dubuque established the first white settlement on the site of the present city of Dubuque. They were attracted by the lead deposits in the vicinity. They opened and in a small way operated mines, but after the death of Dubuque, in 1810, his associates were compelled by the Indians to abandon the settlement. All that portion of country drained by the Mississippi was claimed by France because of the explorations made by Marquette and some of his companions, and because of settlements made by other Frenchmen. France's claim to this territory was ceded by treaty to Spain in 1763, but the country was returned to France in 1800–01. In 1803 all the territory now known as the Louisiana Purchase (q.v.) was bought of France by the United States government. The territory now the State of Iowa was part of the Territory of Louisiana in 1805; of Missouri in 1812; of Michigan in 1834; of Wisconsin in 1836. Iowa became an independent territory in 1838, and was admitted as a State in 1846. The Indian claims to lands within the boundaries of the State were purchased by the United States government before its admission as a State. The last purchase was made in 1843. Remnants of the Sacs and Foxes occupy a reservation, 419 acres, in Tama County, and still receive annuities from the government. In 1832 a settlement was made at Fort Madison, an abandoned government post, and soon after Burlington was founded, and in 1830 a settlement was again made at Dubuque. In 1857 the Indians attacked the settlers living near the Okoboji lakes and Spirit Lake, in Dickinson County, and about 30 whites were killed and nearly all the houses burned. This action on the part of the Indians retarded for some years the growth of that section of the State. Burlington was first selected for the Territorial capital. Iowa City became the State capital in 1846. In 1857 the capital was removed to Des Moines. Iowa had in the Federal army during the Civil War 75,839 men, which was about one-tenth of her population. Some of this number were in regiments belonging to other States.

Territorial and State Governors.

TERRITORIAL		
Robert Lucas		1838–41
John Chambers		1841–45
James Clark		1845–46
STATE		
Ansel Briggs	Democrat	1846–50
Stephen Hempstead	"	1850–54
James Wilson Grimes	Whig and Free-Soil Democrat	1854–58
Ralph P. Lowe	Republican	1858–60
Samuel J. Kirkwood	"	1860–64
William M. Stone	"	1864–68
Samuel Merrill	"	1868–72
Cyrus C. Carpenter	"	1872–76
Samuel J. Kirkwood	"	1876–77
Joshua G. Newbold	"	1877–78
John H. Gear	"	1878–82
Buren R. Sherman	"	1882–86
William Larrabee	"	1886–90
Horace Boies	Democrat	1890–94
Frank Darr Jackson	Republican	1894–96
Francis Marion Drake	"	1896–98
Leslie Mortimer Shaw	"	1898–1902
Albert B. Cummins	"	1902–08
Warren Garst	"	1908–09
B. F. Carroll	"	1909–13
George W. Clarke	"	1913–17
William L. Harding	"	1917–21

Bibliography.—Aldrich, 'Annals of Iowa'; State Historical Society publications; Sham-

*The figures above are obtained from the state census of 1915, compiled in 1916.

baugh, 'Documentary Material Relating to the History of Iowa'; Monette, 'History and Discovery of the Mississippi Valley'; Iowa Geological Survey publications; Shambaugh, 'History of the Constitutions of Iowa,' 'Messages and Proclamations of the Governors of Iowa'; Gue, 'History of Iowa'; Brigham, 'Iowa; its History and its Foremost Citizens' (1919 ed.).

JOHNSON BRIGHAM,
Librarian, Iowa State Library.

IOWA, State University of, an educational institution forming an integral part of the public school system of the State, situated at Iowa City. It was first opened in 1847, receiving control of lands given by the Federal government. (See COLLEGES, LAND GRANT). The university is controlled by a State board of education, composed of nine members appointed by the governor of the State subject to confirmation by the senate. Its work is organized in the following departments: the college of liberal arts (including the summer sessions), which offer courses leading to the degrees of B.A. and B.S.; the graduate college; the Iowa school of commerce, with both undergraduate and graduate courses; the college of law; the college of medicine; the college of homœopathic medicine; the college of dentistry; the college of pharmacy; the college of applied science and the college of education. The library, which lost 25,000 volumes by fire in 1897, now contains 125,000 volumes; the university issues the following publications: 'Natural History Bulletin'; 'The Law Bulletin'; 'The University of Iowa Studies in Psychology'; 'The State University of Iowa Studies in Sociology, Economics, Politics and History'; 'Contributions from the Physical Laboratory of the State University of Iowa'; 'Studies in Medicine'; 'Aims and Progress of Research'; 'Studies in Language and Literature'; 'Studies in Education.' The State appropriates over $700,000 annually to the university, and the total income amounts to over $950,000 annually. In 1915 the number of students was 2,965; the number of professors and instructors, 209.

IOWA CITY, Iowa, city and county-seat of Johnson County, on the Iowa River, and the Burlington, Cedar Rapids and Northwestern, and the Chicago, Rock Island and Pacific railroads, 54 miles west of Davenport. The city is pleasantly built on a succession of plateaus, rising one above another from steep river banks. The first plateau is laid out as a public promenade, and the third, which is about 30 feet higher than the first, is crowned by a handsome Doric edifice 120 feet long and 60 feet wide, of a beautifully marked stone quarried in the vicinity called "bird's-eye marble." This building was originally intended for the State capitol, but, on the removal of the seat of government to Des Moines, was appropriated to the State University. From 1839 to 1854, this was the seat of the Territorial and State governments. It is the seat of the State University of Iowa, the Iowa State Academy, the State Historical Society and Library, the Homœopathic, Allopathic and Mercy hospitals. It is the farming trade centre for Johnson, Cedar and Iowa counties; has excellent power provided by the Iowa River; and manufactures flour, iron, woolen goods, perfumery, gloves, jewels, fencing and linseed oil. The city has electric light and street railroad plants, waterworks on the Holly system and numerous churches. Besides its manufacturing interests the city has an extensive stock-raising and meat-packing industry. Pop. 13,500.

IOWA COLLEGE. See GRINNELL COLLEGE.

IOWA FALLS, Iowa, city of Hardin County, 50 miles east of Fort Dodge, on the Chicago, Rock Island and Pacific, the Chicago and Northwestern, and the Illinois Central railroads and on the Iowa River. Ellsworth College is situated here. The city has a Carnegie library, internal combustion engine works, drainage machinery, tile works, etc. There is a large trade in agricultural produce and in building stone. In 1914 the city-manager plan of government was put in force. Pop. 3,716.

IOWA RIVER, in the State of Iowa, rises in Hancock County, near the Minnesota State line and flows southeast into the Mississippi River, north of Burlington. It is 300 miles long, and is navigable to Iowa City, 80 miles from its mouth.

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, at Ames, Iowa, is a co-educational and techincal institution with five main divisions of work: agriculture, engineering, home economics, industrial science and veterinary medicine. The college was founded in 1868. With campus and farms it covers 1,339 acres; the land is valued at $208,979.50; and the buildings cost $2,715,085. The college library contains over 50,000 volumes. The enrollment of students, collegiate and non-collegiate for 1915–16, including the summer and winter sessions was 5,502. The college has over 4,000 graduates and bases its strongest claim to success as an educational institution on the work of these men and women in their vocations throughout the United States and the world. The college is supported by Acts of Congress known as the Morrill Acts (1862 and 1890). The support funds for 1915–16 amounted to $1,347,294.

IOWA WESLEYAN COLLEGE, Mount Pleasant, Iowa, a coeducational institution founded in 1844 under the auspices of the Methodist Episcopal Church. Admission is nonsectarian. The faculty numbers 26; the average annual attendance of students is 500; tuition fees amount to 90; living expenses to $300. The productive funds total $650,000; the annual income including tuition fees and incidental charges is $32,085. There are over 12,000 volumes in the library. The number of graduates since organization is 1,058. The college colors are white-purple.

IOWAS, a tribe of American Indians of the Algonquin family. In 1800 the Iowas lived in Minnesota and soon after moved southward. They were called Palinchas, or "Dusty Noses," in their own tongue. Lewis and Clark, the explorers, designate them as the Ayanways, and the early French traders called them the Ajowes. In 1836 they moved to the Wolf River region west of the Mississippi, and in 1861 ceded 16,000 acres of land to the United States. The remnants of the tribe, less than 500 in number, at present live on reservations in Oklahoma and Kansas. (See also INDIANS, AMERICAN; IOWA).

Consult Miner, W. H., 'Iowa Indians: A Sketch of their History' (Cedar Rapids, Iowa 1912).

IPECAC, or **IPECACUANHA,** a South American plant of the order *Rubiaceæ* variously called by botanists *Cephælis ipecacuanha* and *Psychotria ipecacuanha.* The plant, which is found mainly in moist shady forests in Brazil, is a creeping herb or sub-shrub with mostly bare stems, only the extremities producing leaves. The small white blossoms, which are borne in heads with long stalks, are followed by dark purple berries. The rather fleshy more or less divided roots were in medicinal repute among the South American Indians, and gradually found their way into European medicine under the name "ipecacuanha." They have been considered emetic, nauseant, diaphoretic and expectorant, and in large doses are poisonous. They appear in commerce in various grades (gray, brown and red), which are dependent mainly upon the season at which they are gathered, the way they are dried, the age of the plants, etc. The chief supplies are collected during January, February and March by the Indians. Owing to the slow growth of the plant and the low price the roots command, ipecac is not cultivated commercially; it has, however, been successfully grown in various parts of the world. It is a constituent of Dover's powder. The roots of several other plants are substituted for those of true ipecac among the best known being those of *Tylophora asthmatica* and *Sarcostemma glaucum* (Venezuelan ipecac), both of the natural order *Asclepiadaceæ.* Other species of *Psychotria* and certain species of *Richardsonia* are similarly but unofficially employed.

Wild or American ipecac (*Gillenia stipulacea*) of the rose family, is a common plant in the southeastern United States and as far north as western New York. It is a perennial herb about three feet tall, bearing paniculate corymbs of white or pale rose colored flowers. It is hardy, of simplest culture and being graceful is frequently planted for ornament in flower borders where the soil is of good quality.

IPEK, Montenagro, town situated on the White Drin (Bitritsa), near the Serbian frontier. It is famed for its ancient monastery, founded in the 13th century and until 1690 the seat of Patriarchs of Serbia. The town is well built. Silk is raised and spun in considerable quantities and fire arms are manufactured. Until 1913 the town was in Turkish territory, in the vilayet of Kossovo and sanjak of Novibazar. Pop. 10,500, mostly Serbs and Albanians.

IPHICRATES, ī-fik'ra-tēz, Athenian commander: b. and d. in the 4th century B.C. Of humble origin, he raised himself to eminence by his courage and talents. In the war of Corinth (393–92 B.C.) he opposed with success Agesilaus, the warlike king of Sparta. He was sent to the Hellespont to act against Anaxibius, but in spite of his victory was unable to prevent the conclusion of the shameful Peace of Antalcidas (387 B.C.). In 369 B.C. he was appointed to the command of the troops sent by the Athenians to the assistance of Sparta, on the invasion of Epaminondas, but allowed the Theban general to retreat from the Peloponnesus. In the Social War (357–55) he was one of the commanders of the fleet fitted out by the Athenians for the recovery of Byzantium. Being accused of treachery and neglect of duty in the battle at the Hellespont, by one of his colleagues, Chares, and put on trial, he was acquitted, while his colleague Timotheus was fined 100 talents; but though he lived to a great age, he did not again engage in active service. Iphicrates was the author of some improvements in Greek arms and accoutrements. He was accustomed always to fortify his camp in the field even in a friendly country; "Because," he said, "if, contrary to probability, I should be attacked, I may not be obliged to make the disgraceful excuse that I did not expect it." Consult the life by Cornelius Nepos and Bauer, 'Die griechischen Privat-und Kriegsaltertümer' (2d ed., Munich 1893).

IPHIGENIA, in Greek legend, a daughter of Agamemnon and Clytemnestra (according to some an illegitimate daughter of Theseus and Helen), who was to have been sacrificed to Artemis (Diana) at the advice of the prophet Calchas, when the goddess, enraged with Agamemnon, detained the Greek fleet in Aulis by a calm. Under pretense that she was to be married to Achilles, Iphigenia was led to the altar. But in the moment when the priest was about to give the death-blow Iphigenia disappeared, and in her stead a beautiful hind was substituted, whose blood gushed out on the altar. Artemis had relented, and conveyed her in a cloud to Tauris, where she became the priestess of the goddess. Conformably with the law of the country, she was obliged to sacrifice every Greek that landed there. While serving as priestess her brother Orestes came to take away the image of Artemis, as he had been advised by an oracle to do, that he might get rid of the madness to which he had been subject since the murder of his mother. Iphigenia having recognized him as her brother, the two contrived a means of escape, and carried off with them the image. The story is first told in the 'Cypria,' a Greek poem describing the events preceding the Iliad, and is depicted on vases, sarcophagi and wall paintings. The story of Iphigenia was dramatized by Euripides who composed two plays upon the subject — 'Iphigenia in Aulis' and 'Iphigenia in Tauris'; by Goethe (1789) under the title 'Iphigenie auf Tauris,' and by Racine as 'Iphigénie' (1674). It is also the subject of two operas by Gluck, 'Iphigenie en Aulide' (1774); and 'Iphigénie en Tauride' (1779). Consult Gayley, C. M., 'The Classic Myths in English Literature and Art' (2d ed., Boston 1911); Hall, F. A., 'Iphigenia in Literature' (Saint Louis 1911).

IPHIGENIA IN AULIS, opera by Christoph von Gluck, produced in Paris in 1774 and 1779, respectively, the latter being a continuation of the first. The plot is based on the Greek legend of Iphigenia, daughter of Agamemnon and Clytemnestra. To avert the wrath of the goddess Artemis (twin-sister of Apollo), whom Agamemnon had angered by killing a consecrated hind, Iphigenia was demanded as a sacrifice on the altar, pending which Artemis held the Greek fleet destined for Troy in the harbor at Aulis. Calchas, the High Priest of Artemis tells Agamemnon that a favorable wind will come only after the sacrifice. Iphigenia is prepared to immolate herself, but her lover, Achilles, forces his way through the crowd to save her, when she is miraculously conveyed in

a cloud to Tauris to become a priestess to Artemis there in the temple of the barbarous Scythians. In the second opera Iphigenia has served 15 years in performing the rites of offering human sacrifices when her brother Orestes falls into her hands, together with his friend Pylades. She does not know her brother, nor that he had slain his mother and fled, pursued by the furies. Just as she is about to stab Orestes, he declares himself, and the knife falls from her hand. Thoas, king of the Scythians, rejects her entreaties and commands that both she and her brother shall die. His design is frustrated by the return of Pylades — who had been suffered to depart — with some of his countrymen, and the king is slain. Diana intervenes with her protection and permits brother and sister to return home. The *Tauris* is by many critics considered to be Gluck's masterpiece.

IPHIGENIA IN TAURIS. Goethe's 'Iphigenie auf Tauris' (1787) was first written in prose in 1779 and was performed by members of the court of Karl August, Goethe impersonating Orestes. For the conception of the subject we therefore look to the circumstances of Goethe's life in Weimar at the end of his fourth year there. He had outgrown his "storm and stress," he had acquired discipline and learned self-denial, and he had come to reverence in Charlotte von Stein a woman to whom he felt so spiritually akin that in a previous existence, he said, she must have been his sister or his wife. Withal, he had enough to regret of earlier misdeeds: he could fully enter into the tortured soul of the matricide Orestes. But the traditional Iphigenia was born again in his drama into the saintliness of pure and redeeming womanhood. Not unwilling to be guided by her brother, she nevertheless by her mere human presence restores him to sanity. Unwilling — as no Greek would have been — to outwit even a barbarian, she inspires a disappointed king with magnanimity and converts a nation from cruelty, merely by telling the truth. The versified form which, with little alteration of the original prose, Goethe gave to his 'Iphigenie' in Italy makes this drama an exquisite example of composition in what he himself, in a little essay written in the following year, denominated "style": creation such as Nature would exemplify under perfect conditions, and such as art attains when, without sacrifice of individual reality, it suggests and typifies the universal. Translated by Anna Swanwick, London, 1850. Edited by L. A. Rhoades (Boston 1896).

IPIALES, ē-pya'las, Colombia, town in the Department of Cauca, on the frontier of Ecuador. It is among the highest towns of the world being situated at an elevation of 10,000 feet above sea level. It has a customs-house. Pop. about 10,000.

IPOMÆA, ĭp-ō-mē'a, a genus of plants, including several hundred species, of the family *Convolvulaceæ,* consisting mostly of twining or prostrate herbs, widely distributed in warm regions. The species of most importance is *I. purga,* which yields the jalap of commerce. Some are cultivated for the beauty of their flowers, and are known to gardeners as convolvuli. *I. purpurea,* the common morning-glory, is the best known garden species. See JALAP.

IPPOLITOV-IVANOV, ĕp-pŏl'ē-tŏf-ē-vä'nŏf, **Michail Michailovitch,** Russian composer: b. Gatchina, 19 Nov. 1859. He studied at the Conservatory of Saint Petersburg under Rimsky-Korsakov, removed thereafter to Tiflis where he became director of the conservatory and the opera and also conductor of the symphony orchestra. His stay in the South resulted in the publication of a standard work on the folk-songs of Georgia entitled 'The Georgian Folk-Song.' He was made professor of composition at the Moscow Conservatory in 1893 and in 1906 was made director. In 1899 he became conductor of the Moscow private opera and did much in that capacity for the struggling composers of the new Russian school. Ippolitov-Ivanov has written the operas 'Ruth' (1887); 'Assya' (1900); 'Yabava Putyatishna' (1901); 'Treachery' (1911). Other works are 'Caucasian Sketches,' a suite for orchestra; several cantatas, a scherzo, choral works, piano compositions and some chamber music.

IPSWICH, Australia, town in Stanley County, Queensland, on the Bremer, 22 miles west of Brisbane. It is located in a thriving agricultural region, also favored with extensive coal deposits. It has iron foundries, woolen mills and lumber yards, railroad shops, etc. Pop. 14,028; with suburbs 25,000.

IPSWICH, England, a market-town, parliamentary and municipal borough and river-port in Suffolk, on the Orwell River at its confluence with the Gipping, 10 miles northwest of Harwich and 68 miles northeast of London. The older parts of the town have narrow crooked streets, some of the old houses of which are ornamented with curious carved work. It contains numerous churches and benevolent institutions, a town hall, art museum, mechanics' institute, corn exchange and an ancient mansion of the Tudors. Of its educational establishments the principal is the grammar school founded by Cardinal Wolsey and endowed by Queen Elizabeth. Ipswich is a large industrial centre, manufacturing railway supplies, agricultural implements, clothing, shoes, soap, ships, etc. About everything made of metal is turned out in Ipswich. There are municipal baths, wharves, library and markets. It sends two members to Parliament. Ipswich has some Roman remains. It was pillaged by the Danes in 991 and again in 1000. Pop. 73,932. Consult Wodderspoon, John, 'History of Ipswich' (Ipswich 1850) and 'Victoria County History: Suffolk.'

IPSWICH, ĭps'wĭch, Mass., town in Essex County, on the Ipswich River near its mouth and on the Boston and Maine Railroad, 27 miles northeast of Boston and 9 miles south of Newburyport. As Agawam, it was settled in 1633 by John Winthrop and 12 others. The name was changed to Ipswich (after Ipswich, England), in the following year, by resolution of the Massachusetts General Court. As early as 1634 it had a meeting-house, while in 1642 the first free school in the town was established. Ipswich was among the foremost towns of Massachusetts in resisting the arbitrary taxation introduced under Governor Andros in 1687 and a number of its citizens suffered punishment in consequence of this action, which foreshadowed the stand to be taken later, by this town and the colonies generally, against similar

policies on the part of the British government. The town has various industries, among the articles manufactured being grist-mill products, hosiery and underwear, bricks, lumber and boxes, carriages, cabinet-work, soap, isinglass, heels, etc. The Manning high school, the Ipswich Historical Society and the excellent public library give the town rank and influence in educational and literary affairs. Pop. 6,272.

IQUIQUE, ē-kē'kā, Chile, a seaport in the province of Tarapacá, holding the first position among all Chilean cities in the matter of exports and the third (surpassed only by Valparaiso and Talcahuano) in respect to imports. It owes its prosperity largely to the export of nitrate of soda and borax, the former of which especially is found in great quantities in the pampa of Tamarugal. In 1868 and again in 1877, the town was almost entirely destroyed by an earthquake. In 1879 it was bombarded and captured by Chile from Peru; and in 1891 it was much damaged by insurgents. Pop. in 1917 about 70,000.

IQUITOS, ē-kē'tōs, a native tribe in Peru, residing at Loreto, on the left bank of the Marañon, about 75 miles above the mouth of the Rio Napo: The settlement has an active trade, valued at $2,000,000 annually; the imports are exchanged mostly for india rubber. In 1900 they numbered about 12,000.

IQUITOS, Peru, city, river-port and capital of the department of Loreto, on the upper Amazon, near the mouth of the Nanay, 2,500 miles from Pará, Brazil. It is 350 feet above sea-level and has a healthful climate with a mean annual temperature of 75° F. There are really two towns, one of which is inhabited by the Iquitos Indians. Ocean-going vessels ascend the Amazon to this point, and the river is navigable for lesser craft for 425 miles further up. Iquitos is the second port of Peru, having three ocean lines making regular voyages thither. Its annual foreign trade amounts to $10,000,000. Rubber is the largest item of export. The city has machine shops, ship yards, hat and hammock manufactures and fish-curing. In 1908 wireless communication was installed with Puerto Bermudez; the latter place having a land line over the Andes to the capital. Iquitos was founded in 1863, but did not grow very rapidly until the Amazon was opened to navigation, since when Iquitos is the trade centre of eastern Peru. A United States consul is stationed here. Pop., municipal 6,000; district 12,000.

IRADE, ĭ-rā'dĕ, a Turkish decree or command of the Sultan, directed to his grand vizier, whose duty it is to announce it to the public.

IRAK-ARABI, or **IRAK EL ARABI,** the ancient Babylonia, now comprised in the Turkish vilayets of Bagdad and Basra. It is part of the alluvial plain in the valley of the Tigris and Euphrates. Its western part is sandy desert, and part is also swampy. Within its borders are the ruins of Babylon, Seleucia and Ctesiphon. It includes also the modern Bagdad, Basra and Kerbela. It was crossed by the British forces in 1917–18, just previous to the collapse of Turkey in the War of 1914–18. Turkish sovereignty was not fully acknowledged throughout this region and marauding bands of tribesmen frequently molest the caravans passing through. The population of the entire region is estimated at 3,000,000 probably 30 per cent too high.

IRAN, ē-rān, Asia, a general name applied to a great table-land stretching in the North from Caspian Sea, Turkestan and the foothills of the Caucasus on, from the Indus River in the East, to the Tigris River in the West, as far South as the Persian Gulf and the Indian Ocean. Politically this whole vast region is divided into Afghanistan, Persia, Baluchistan and Kafiristan and it also includes some of the border lands of British India. Persia, however, claims for itself alone, politically and otherwise, the appellation of Iran. The population forms the Iranian branch of the Aryan race. In the Pehlevi inscriptions of the famous Sassanide ruler, Shapur I (A.D. 242–72) the country is called Aïran, i.e., the land of the Aryan, in distinction from Aneran, land of the non-Aryan; the latter since the days of Firdûsi is termed Tûran.

The extremes of climate over this wide area were just as pronounced in ancient as in modern times. As witness the modern Persian saying: *Irân hĕfte klimat dâred,* i.e., Iran has seven climates. Along the Persian Gulf in the districts of Busheer and Mohammerah, it is very hot, in the Elburz range intensely cold. Very diversified also have always been its characteristics and features. However, both in the remote past and in more recent times Iran, though a rather ill-defined unit, has been of enormous influence, not only geographically and ethnologically, but in its bearing on history, in the diffusion of the Indo-Germanic idioms. Topographically considered the immense area is surrounded on all sides by high mountain ranges, these aiding materially in keeping out invaders and preserving within the enclosed territory a homogeneity of language and customs. Thus, despite the numberless vicissitudes undergone by the Iranian stock during immemorial ages, all the accounts that have come down to us seem to agree in ascribing to the people of Iran a set of traditional habits and customs as well as a physical makeup which tally in the main with those still observable in the Persians of to-day.

The earlier travelers and authors, notably Eratosthenes and Strabo, limited the appellation of Ariana (or Iran, Eran) to its southeastern portion, excluding Persia proper, Media and Bactria. Pliny confounds in his description Ariana with Aria, Areia, i.e., the district of Herât. But Strabo admits that many writers gave to Ariana a more extended meaning, comprising the Persians, Medes, Bakhtrians and Sogdians, as they all spoke the same language, with slight dialectic variations.

The whole enormous area, of which the Persia of to-day with its 628,000 square miles is but about one-third, is rather poorly watered, lacks adequate rainfall in large sections of it, and presents vast stretches of salt-impregnated, wholly arid and barren land. The great desert domain of Iran, in fact, extends right across the high plateau, going from a northwesterly in a southeasterly direction, and dividing the fertile provinces of the whole into two groups. This desert is continuous from the southern base of the Elburz Mountains (overlooking in the north the Caspian) to the arid ranges of

Makrân, bordering on the Persian Gulf. It is about 800 miles in length, but varying greatly in width. The indigenous name for this desert is Dasht-i-Lût, and of it the saline swamps and the salt area are known as the Dasht-i-Kavir.

From the foregoing it may easily be seen that in productiveness, too, Iran varies enormously. It is believed to be the original home of the peach, the melon, the cucumber, the cherry and the rose, the wheat plant and the poplar. In general, on its territory grow the trees, the fruits and the cereals of the temperate and of the subtropical zones. There are districts, such as, for example, Masanderân and Ghilân, the neighborhood of Shiraz and Shuster, etc., where the yield is enormous. Wherever the rainfall is abundant, such as along the shores of the Caspian and parts of the southwest, and where woods are still remaining and rivers are flowing in a permanent bed, there is also fertility, and wherever these conditions do not subsist the contrary prevails. Some districts, like those of Busheer and Jesk in the south and around the entire shore of the Caspian Sea, have plenty of rain. Iran, however, suffers unavoidably in its prosperity from the almost total absence of large and navigable rivers.

The population of Iran — using the term in the widest sense — seems to have been much greater in antiquity than at the present time. Undoubtedly incessant warfare, deforestation and a deficient system of tilling the soil practiced for thousands of years and pursued down to our own days, as well as unwise administration and laws, are largely responsible for this.

In historical times Iran (Eran) and Fars (Persia, Farsistân) were for long periods almost identical. This refers not merely to the exploits and religion of Iran, but also to its art, science, language and literature.

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WOLF VON SCHIERBRAND,
Author of 'America, Asia and the Pacific,' etc.

IRANIAN, a name applied to racial groups of people speaking the Iranian stock of languages. In historic times the Iranians appear on the shores of the Oxus and of the rivers of upper Sogdiana, and thence spread southwest through Balkh and Badakshan. It is probable that in the flourishing ages of the Persian empire the Iranic races were spread much farther, to the Kûr and even beyond. Colonies of Iranians were to be found in the Crimea and mingled with the Thracians. It is thus established that the Iranians were in ancient times the connecting link between the Aryan races of Asia and of Europe. At an early period the Iranians and the Indians probably formed but a single group of races. In antiquity the chief components of the Iranic peoples were the Medes and Persians, as well as the inhabitants of those provinces designated as Ariana; but beside them there were also the ancient nomadic hordes of Iranic stock, the Daha or Dahans, who afterward mingled with the Turanians that occupied the steppes of Turkestan as far as the Sarmatians and Scythians of the present south of Russia. That the latter, though, were conscious of their Aryan and Iranian descent is proved by the names borne by the Scythian (Scolot) kings, such as Ariantas and Ariapeithes (Herodotus). In our day, under the head of Iranians, may be classed the Persians and the Parsis, scattered throughout Persia and India; the Tadjiks, who speak Persian and follow agriculture or commerce, in Afghanistan, Baluchistan and Turkestan; then the Koords and Lures, the Afghans, the Ossetians in the Caucasus, the Tais in the region of Baku, the Goorans in Kurdistan, the Galtchas and Pathans on the Pamir plateau and, perhaps, the Armenians. All these populations and tribes stand on very different levels of culture and are also greatly distinguished physically from each other, owing to admixture of foreign elements — such as the Uzbeks and Sarts in Central Asia, influencing the Tadjiks; the Dravidas doing the same with the Beloochees, and the Semitic neighbors in the West playing a similar part. Generally speaking, the Iranians are dolichocephalous and swart, while the Ossetians, Galtchas, etc., are brachycephalous and fair.

The system of religious worship developed by the Iranians started, of course, with that of the Aryans as a whole. With the latter they shared the myths of Ahûra, Mithras, the dragon-slayer Verethreghna (Indra), Apam — Napat (lightning); they believed in the divine afflatus brought about by *soma* and its preparation; in the injunction to "good thoughts and good works," imposed alike by the Iranian Avesta and the Indian Veda; in the supreme order of the world, controlling men and gods alike, in fire-worship, sun-worship, the sacrificial and purifying flame. And in spite of later rites, many hoary sagas and legends have survived, such as that of a fearful battle waged by the sun-god against a terrific serpent; that of the first man, Yama, who now rules in the nether world; that of the "Glorious One" (Husrava, Chosroes), who meets death at the hands of his unknown father (compare the saga of Hildebrand and Hadubrand, the Sakuntâla, the Kalevâla) and others which antedate historic times. It is certain that the Gâthas (ancient psalms) were extant as early as the 13th or 14th century before our era. Zoroastrianism, in the form in which it became the dominant creed of the Iranians, made wise use of the old gods and of the early heroes, transfusing them into efficient helpers of the All-Ruler, Ahuramazda (Ormuzd). In the reign of the legendary King Gushtasp, the patron of Zerdusht (Zoroaster), a period antedating the prevalence of his dogma in Media, in 714 B.C., by several centuries, this prophet and sole founder of one of the purest creeds of the East, attains to power as a teacher. The substance of his tenets was that in this world there are two groups of powers confronting each other in a war without cessation — the powers of Good, of Light, of Creative Strength, of Life, of Truth, and the powers of Evil, of Darkness, Destruction, Death, Deceit. The "great Wisdom," Mazda, with his servants, the "Undying Holy Ones," and a great host of subordinate angels and helpers, is forever facing, battling with, conquering the Evil Spirit (Angra Mainyu, Ahriman) and his tools. The latter are slightly

altered reincarnations of the old Iranian gods, now discarded and cursed as "Evil Workers." Zoroaster asks each man to ponder and choose his position with regard to the fundamental problems of life and religion. From his teachings sprang a priesthood, the Magians, entrusted with the task of administering to the needs of the believers. Zoroastrianism was still strong in the early part of the Christian era, and under the Sassanides, about 220 A.D., there came a revival. This we see from a polemic against the Christians (Armenians) during the reign of Yezdegerd II, about 450 A.D., the details of which have been preserved by the Armenian historian, Elishe. The creed of Zoroaster, however, toppled and fell an easy prey to Islam during the early caliphate in the 7th century. Iran, it is true, for the larger part embraced Shiah, and thus became the inveterate foe of the Sunnite Arabs and Turks; but it nevertheless became Moslem, fanatically so, and buried its ancient national faith forever. The modern Iranians have, however, retained the chief marks of their fathers — a great suppleness of mind, a joyous, lively temperament, a taste for and skill in poetry, the arts and artcraft, an extraordinary politeness and suavity of manners, coupled with rather loose morals, dislike of frankness and an enormous racial pride.

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IRANIAN LANGUAGES AND LITERATURE. The dead and living languages of Iran together form, with some sporadic vernaculars existing outside its strict boundaries, the Iranian family of the Aryan or Indo-Germanic speech. Among them are, however, several that have strongly deteriorated or else show considerable mingling. Thus, Afghan is greatly intermixed with Sanskritic elements; hence it is classed with the Indic by some writers. The earliest type of Iranian we know of is the Zend or Early Bactrian, and this again shows two subdivisions, a more remote and a less remote one. Both of these we only became acquainted with from the surviving fragments of the Zendavesta, as well as from the Gâthas, a species of psalms, the latter being much the oldest of the two. The ancient tongue perished on the destruction of the Persian Empire by Alexander the Great. This ancient Zend is indubitably closely related to Sanskrit and is wholly devoid of the Semitic gutturals with which modern Persian abounds; and with its wealth of vowels (notably the flat and high "a" and "o") is both melodious and virile. Only slightly younger is Early Persian, the tongue in which cuneiform inscriptions of the Achaemenids are couched. These inscriptions, found in Persepolis, Behistûn and elsewhere, which by reason of their similarity to Sanskrit and Zend, and further by reason of frequent parallel columns in Zend, are most interesting from a philological viewpoint. Early Persian and Sanskrit, have been wholly deciphered, reach down to the 4th century B.C. and show plain indications of the development of the Persian, or Iranic, idioms. Old Persian seems to have been mostly current in the west, Zend in the east of Iran. The next degree of internal change is perceived in Pehlevi, or middle Persian, for in this nearly all the former distinctive case endings and tense forms of the verb, etc., disappear. Pehlevi, nevertheless, for four centuries became the court idiom during the whole of the Sassanide dynasty. With the Arab conquest, in the latter part of the 7th century, and the enforced introduction of Islam, Pehlevi disappeared, together with the ancient faith. The remaining adherents of Zoroastrianism, the so-called Parsîs or Parsees, scattered throughout Persia or found a refuge in India. And the Parsees up to this date still utilize Zend or Pehevi for ritual purposes.

Finally, however, with Firdûsi's 'Shah Nameh,' the great national epic of Persia, the last stage, New Persian, is reached. And New Persian transcends the Pehlevi (or Middle Persian) both in its purity of idiomatic diction and in its paucity of grammatical forms. New Persian, in fine, knows no grammatical gender, no case endings whatever, and expresses the various tenses of the verb by making extensive use of auxiliaries and prepositions. It is, therefore, next to English, most deficient in grammatical forms; but to compensate for this loss it possesses a great vocabulary and a rich and nicely developed syntax. However, since the days of Firdûsi (1021 A.D.) modern Persian has again changed quite considerably, in that it has adopted innumerable words, even whole phrases, from the Arabic (losing thereby much of its one-time wealth of vowels) and in broadening its scope of word and syllable combination, such cases as a compound word made up of a noun and an adjective or of part Arabic and part Persian being by no means rare. Only the provincial dialects still spoken extensively have kept themselves freer from such wholesale borrowing, and in a sense the purest Iranic is to-day spoken in the province of Masanderan, near the Caspian. Closely related to New Persian are also the Koordish dialects, the Pashtoo (Afghan), which latter likewise prevails in the northwestern provinces of India; the Baluchi, and the idiom of the Ossetians (who call themselves Irôn, Iranians) in the Caucasus. The speech of the ancient Scythians, who dwelt on the shores of the Euxine, likewise showed Iranian type. The great hiatus between the flourishing era of Zend, during and before the Achaemenid dynasty, and the final re-establishment of a native Persian Empire under the Sassanides, was due to the rulers of foreign blood. Again, the ancient sacred literature was largely destroyed when Islam was introduced with fire and sword by the Arab invaders, although Zoroastrian worship survived to some extent in Yezd, Kermân, etc., and was also introduced in India by fugitives. The remains of the holy books extant at the time of the Arab conquest are still preserved, partly in the original language, but mostly in an ancient translation. The vehicle used in this translation was Huzvaresh, the literary form of Pehlevi. Sir William Jones (1789) was the first to identify Pehlevi as next of kin to Sanskrit, himself following in the footsteps of his French forerunner, Anguetil-

Duperron (1771). However, a whole generation passed before thorough progress was made in the reintegration of the language. Schlegel and Bopp first put Sanskrit on a sound philological basis by their extensive labors, and simultaneously the fundamental study of the allied Iranian languages also gained ground rapidly. Burnouf, Olshausen, Brockhaus, Spiegel, Haug, Lagarde, Justi, Lassen and Westergaard did much to that end. It deserves mention that our knowledge of Huzvaresh is wholly derived from the translations of the Avesta and of the Gâthas, as well as through a few other religious works, such as the Bundaheesh; furthermore, through inscriptions, coins and gems. It was not always of the same type; rather it differed considerably at different times and places, according to the larger or smaller infusion of Semitic words.

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WOLF VON SCHIERBRAND,
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IRAPUATO, ē'ra-pwa'to, Mexico, town in the State of Guanajuato, 32 miles from Guanajuato, on the Mexican National Railway. It contains several convents and churches dating from the Spanish colonial period. The climate is very mild and certain crops are grown throughout the year. Pop. 21,000.

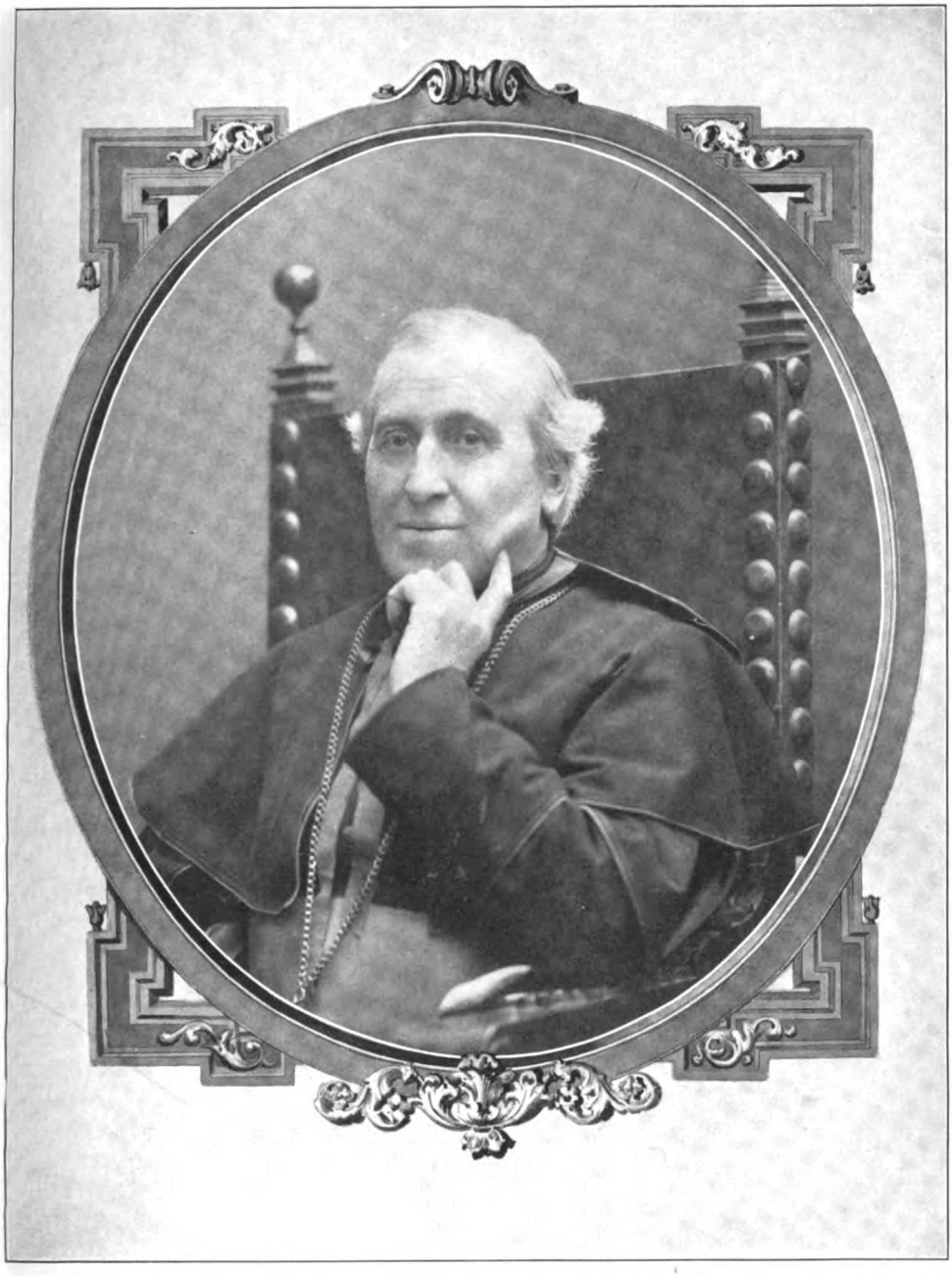
IRAWADI, ĭr-a-wăd'ĭ, or **IRRAWADY,** the chief river of Burma. One branch of it rises near the eastern extremity of Assam, another branch rises in East Tibet, the two branches uniting about lat. 26°. It has generally a south course, being deflected west, and its total length is over 1,200 miles. There are three rocky defiles in which its channel is suddenly contracted, the lowest near Mandalay; but from that point downward to its delta it has generally a breadth of from 1 to 4 miles. About 140 miles from the bay of Bengal which it enters by numerous mouths, the delta commences. The current of the Irawadi is generally slow — even in its upper part being no more than at the rate of two miles an hour; except during the inundations, when it flows so rapidly that no sailing vessels could navigate it but for the assistance of the southwest monsoon. It is navigable from the sea upward for steamers of five feet draft to the Chinese frontier, 900 miles from the sea. Artificial embankments extending 100 miles protect the delta lands from inundation. From Rangoon to Bhamo, crossing a bridge at Mandalay, a railroad runs parallel with the valley.

IRBIT, Russia, town in the government of Perm, on the river Irbit, 110 miles northeast of Ekaterinburg. Since 1643 an annual fair is held here which lasts throughout February and at which all kinds of merchandise and manufactures are sold. It is estimated that over 20,000 people attend and goods to the value of $20,000,000 change hands. The town was founded by the Tatars. Pop. 20,000.

IREDELL, ĭr'dĕl, **James,** American jurist: b. Lewes, Sussex, England, 5 Oct. 1750; d. Edenton, N. C., 20 Oct. 1799. He was appointed comptroller of customs at Port Roanoke, now Edenton, where he arrived in 1768, retained this office several years, and meanwhile studied law. He was admitted to the bar in 1771. He was appointed by the attorney-general his deputy in 1774, and in the same year was appointed collector of the province; in 1777 he was placed by the legislature on the bench of the Supreme Court, then just organized under the State constitution. He resigned in June 1778, and in the following year was made attorney-general of North Carolina. This appointment, too, he resigned in 1782. In 1787 he was designated by the general assembly a member of the State council and sole commissioner to collect and revise the acts of previous assemblies, which were to be considered in force in North Carolina. This collection of the laws, now referred to as "Iredell's Revisal," was published in 1791. In February 1790 he became one of the justices of the Supreme Court of the United States, and held that office till his death. He was a stanch supporter of the federal cause and worked hard for the acceptance of the new Federal constitution by North Carolina. One of the counties of his State was named after him in 1788. The 'Life and Correspondence' of Iredell was published in 1857. Consult Connor, H. G., 'James Iredell' (in *University of Pennsylvania Law Review,* Vol. LX, p. 225, Philadelphia 1912); Davis, J., 'Alfred Moore and James Iredell' (Raleigh 1899); McRee, G. J., 'Life and Correspondence of James Iredell' (2 vols., New York 1857–58).

IREDELL, James, American lawyer, son of the preceding: b. Edenton, N. C., 2 Nov. 1788; d. there, 13 April 1853. He was graduated at Princeton in 1806, and was later admitted to the bar. In the War of 1812 he raised and commanded a company of volunteers. He served for 10 years in the house of commons of his native State, and twice as speaker in a house of which the majority were politically opposed to him. In 1819 he was appointed a judge of the Superior Court, but resigned in 1820. In 1827 he was governor of North Carolina, and from 1828 to 1831 a member of the Senate of the United States. He afterward resumed the practice of his profession at Raleigh, where he was also for many years reporter of the decisions of the Supreme Court of North Carolina. In 1833 he was appointed by Governor Swain one of three commissioners to collect and revise all the statutes in force in North Carolina. The result was the work known as the 'Revised Statutes' (Raleigh 1837). He afterward published a 'Treatise on the Law of Executors and Administrators' (Raleigh 1837). His reports of cases in the Supreme Court and of equity cases were published in 21 volumes (Raleigh 1841–52). He also published 'A Digest of all the Reported Cases in the Courts of North Carolina, 1778–1845' (Raleigh 1839–46); 'A New Digested Manual of the Acts of the General Assembly of North Carolina, 1838–50, etc.' (Raleigh 1851).

IRELAND, ĭr'land, **Alleyne,** American author and lecturer: b. Manchester, England, 19 Jan. 1871. He was educated at the University of Berlin, traveled widely, lectured on trop-



JOHN IRELAND

ical colonization at Cornell University in 1899, and in 1900 was appointed lecturer in politics at the University of Chicago, where his subjects were tropical colonization and Chinese foreign relations. He was afterwards successively lecturer at the Lowell Institute, Boston, one of the private secretaries of Joseph Pulitzer, and joined the editorial staff of the New York *World* in 1911. Besides contributions to periodicals, he has written 'Georgetown, Demerara' (1897); 'Tropical Colonization' (1899); 'The Anglo-Boer Conflict' (1900); 'The Far Eastern Tropics' (1905); 'The Province of Burmah' (2 vols., 1907); 'Joseph Pulitzer' (1914).

IRELAND, John, American Roman Catholic prelate: b. Burnchurch, County Kilkenny, Ireland, 11 Sept. 1838; d. Saint Paul, Minn., 25 Sept. 1918. He came to America in 1849 and attended the Cathedral school at Saint Paul, Minn., and in 1853 went to France and studied theology in the seminary of Meximieux and subsequently in that of Hyeres, remaining there till 1861, when he returned to Saint Paul and was ordained priest on the 21st of December. During the early part of the Civil War Father Ireland tendered his services as chaplain of the 5th Minnesota regiment and later became rector of the cathedral, Saint Paul. An ardent advocate of temperance, he devoted much time and energy to promoting the cause, organized temperance societies and traveled about the country lecturing on the subject. For a time he was secretary to Bishop Grace of Saint Paul, whom he represented at the Vatican Council, Rome, 1870–71, and later became his coadjutor, being consecrated Titular Bishop of Maronea, 21 Dec. 1875. He was likewise very diligent in advancing Roman Catholic colonization in the northwest and not only founded colonies but became a director in the National Colonization Association. Later, in 1887, Bishop Ireland accompanied Bishop Keane to Rome to consult with Pope Leo XIII upon the necessity of erecting a Catholic university in Washington, D. C., and on returning from Europe in 1888, he was made first archbishop of Saint Paul. At one time he endeavored to consolidate the Catholic parochial schools and the public schools. The plan was tried at Faribault and Stillwater, Minn., but after a time was abandoned in deference to Rome. He founded the Hill Seminary to which he gave his valuable library. He was a distinguished lecturer and pulpit orator. As a speaker he was direct and magnetic, with a saving sense of humor. One of the phrases which has often been quoted as characteristic of his particular endeavor in life was this: "The watchwords of the age are reason, education, liberty, the amelioration of the masses." During McKinley's administration Archbishop Ireland was sent on a special mission to Europe to set forth the American attitude. He lectured on American institutions in France, Italy and Great Britain with great success. Of America's democracy he was one of the greatest exponents due in no small measure to his firm convictions regarding his country's place and mission in the world. He was a contributor to the leading magazines, and a member of the American Civic Federation. He published 'The Church and Modern Society.' Yale University conferred upon him the degree of LL.D. in 1901.

IRELAND, William Henry, English literary forger: b. probably London 1777; d. there, 17 April 1835. He imposed spurious Shakespearian MSS. upon his father, Samuel Ireland, a bookseller and engraver, who was a Shakespeare enthusiast, and also upon other men of letters, and produced two "Shakespearian" plays, 'Vortigern' and 'Henry II' the former of which was purchased by Sheridan and acted at Drury Lane, but was a complete failure. The criticisms of Malone led to the exposure of the fraud, which was acknowledged by Ireland in 'Authentic Account of the Shakespearian Manuscripts' (1796). He wrote various novels, poems, etc., besides his 'Confessions' (1805), containing an account of his forgeries. 'Vortigern' and 'Henry II' were published in 1799 and 'Vortigern' again in 1832. Ireland's career forms the basis of a novel by James Payn, 'The Talk of the Town' (1885). His father's correspondence concerning the forgeries, as well as some of the specimens of the latter are in the manuscript division of the British Museum. A large number of pamphlets were published at the time of the discovery of the forgeries. The most important of these will be found listed in Lowe, R. W., 'A Bibliographical Account of Theatrical Literature' (p. 185, London 1888).

IRELAND, the most westerly and smaller of the two principal islands of which the United Kingdom of Great Britain and Ireland is composed, extends from lat. 51° 26′ to 55° 21′ N. and long. 5° 25′ to 10° 30′ W.; its greatest length is 302 miles; greatest breadth, 174 miles; area, 32,583 square miles. It is separated from England by Saint George's Channel and the Irish Sea, and from Scotland by a narrow passage, the North Channel. Ireland is on the continental shelf, or submarine plain, which borders the continental land mass of Europe, hence it is physically part of Europe.

Topography.—The coast line is irregular; from Dundalk Bay to Wexford Harbor on the east there are less indentations than on any other part of the coast; Dublin Bay, an arm of the Irish Sea, is the only indentation of any size on this part of the island. Galway, Sligo and Donegal bays are the largest on the western coast. The Atlantic currents, which beat against the western coast, have worn away the land in many places, thus causing fiords such as exist on the coasts of other countries subject to similar wave-action. Some of the many islands which fringe the coast have been formed by the washing away or the submergence of the land. The capes, promontories, and peninsulas have been formed largely by submergence. Some of the islands, all small, are Aran, Achill, Clare, and Rathlin. The chief ports are Cork, Dublin, Belfast, Waterford, Londonderry and the artificial harbor of Rosslare. There are 14 harbors which will accommodate the largest ocean steamers.

The highlands are chiefly along the coast; the greater part of the interior is a plain. The mountains, more rounded hills than mountains, are short ranges with little or no connection except the several ranges in the southwest. Some of the mountains are Mourne, in County Down, the Wicklow Mountains, Knockmealdown and Galty in the south; Caha, Stack and other ranges in Kerry; Slieve Boughta in Galway, a num-

ber of short ranges in the counties of Mayo, Leitrim, Donegal and Londonderry, and the Slieve Bloom between Queens and Kings counties. The majority of the peaks are less than 3,000 feet in height; Carrantuohill (Carrantual), in Kerry, near the Lakes of Killarney, is 3,414 feet, and Galty Mountains, in Limerick, are 3,015 feet. The plain in the interior is about 500 feet above sea-level.

Hydrography.— The rivers of Ireland, like those of England and Scotland, are small streams. The Shannon, the largest river in the British Isles, has its rise in the northeastern part of the province of Connaught, flows east, south, and west, forming quite a curve before entering the Atlantic Ocean, between the counties of Kerry and Clare. It passes through several lakes, the largest of which are Ree, Allen and Derg. The estuary at the mouth is about 70 miles long; the whole length of the river is about 250 miles, 130 of which are navigable for large steamers. Its importance for transportation has been increased by the canals Royal and Grand, which connect it with Dublin. In the southwest, in County Kerry, is a short mountain stream called Roughly River, with a long, broad estuary called Kenmare River. The Liffey, which flows into the Irish Sea at Dublin, the Lee which flows into Cork Harbor, the Boyne with its tributary, the Blackwater, are all short streams which have been made famous in history and literature. The Foyle, Erne, Lagan, Moy, Slaney, and others reach the ocean through broad estuaries or bays. Lough Neagh (183 square miles) in the northwest is the largest lake of the British Isles. A number of the lakes of Ireland occur along the river courses, but are really basins, and not merely expansions of the rivers. Lakes Conn, Foyle, Belfast, Strangford, Carlingford, and others on the coast are estuaries or fiords, but the land-locked mouths entitle them to be called lakes, like Maracaibo in South America. The famous Lakes of Killarney are in County Kerry, in the southwestern part of the island. There is scarcely a place in Ireland that is more than 25 miles distant from water communication with the ocean.

Geology.—A limestone stratum belonging to the basal portion of the Carboniferous system underlies a large part of the interior plain. The upper Carboniferous rock has been destroyed by erosion except in a few places. Silurian rock underlies nearly all of the northern part, but the Cretaceous, Triassic, and Permian formations exist and appear at the surface in several places. Some of the cliffs of the north are of basaltic formation. The Giant's Causeway (q.v.) on the north coast of Antrim is basaltic. Its 40,000 or more, perfectly formed polygonal columns constitute remarkable specimens of this formation. Crystalline rocks form the axis of the mountains of the province of Connaught, and the highlands of Leinster. Old red sandstone and carboniferous limestone are found in the southwestern counties. Marble exists in large quantities in the county of Kilkenny and in parts of the adjacent counties coal of an anthracite variety is found, but not in large quantities; iron-ore exists in nearly every county. Copper of an excellent quality is in the western mountains, also gold and silver in small quantities.

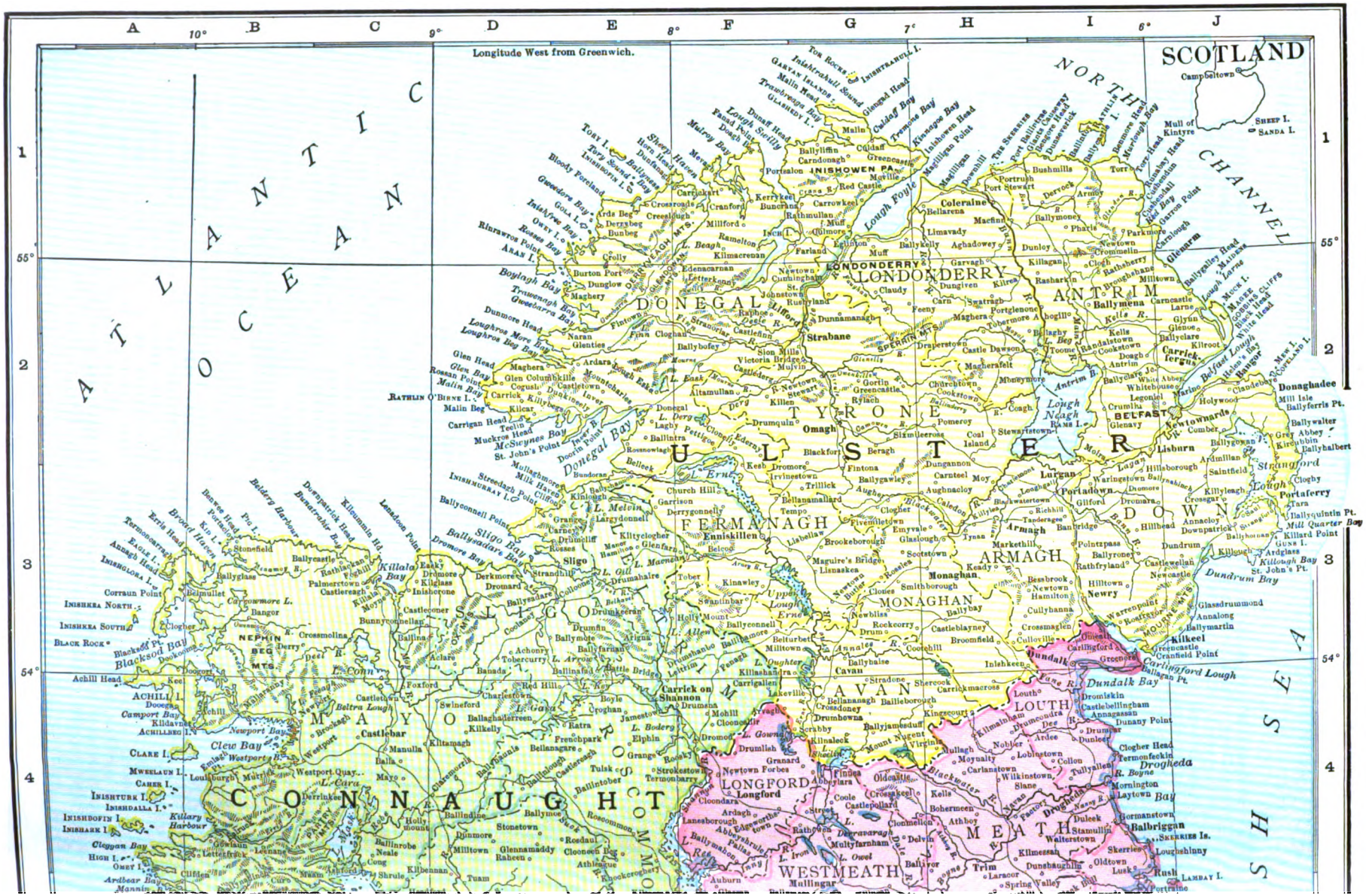
Soil.— The erosion of the limestone rock which has been going on for ages has contributed largely to the fertility of the soil of Ireland. The igneous rocks, the red marls, and other mineral formations, have added to the richness of the soil, and all have been distributed, by the gradual removal of the ice-covering, over a large area of the plain. After deducting the area, about one-fifth of the whole, which is covered by bog, mountain, and moorland, there is left a vast extent of arable surface covered with a deep friable loam of remarkable richness. In addition to the decomposed trap and the calcareous matter derived from the limestone, there is a large amount of vegetable mold which forms one of the most important ingredients of the soil. The bogs, useless for tillage, furnish peat for fuel. The Bog of Allen is the largest one in Ireland.

Climate.— The warm moist winds from the Atlantic blowing over Ireland affect its climate more than any other cause except its latitude. The mean temperature is from 20° to 30° F. higher than other places in the same latitude on the eastern coast of America or the interior of Europe, and a few degrees higher than places in the same latitude on the west coast of America. The summer temperature is modified by the surrounding waters, being lower by a few degrees than inland places of the same latitude. The moisture brought by the winds from the ocean causes a heavy annual rainfall, and much fog, mist and general dampness. The low mountains serve to some extent as condensing agents, so that the greatest rainfall is near the coast.

Vegetation.— The climate and soil are very favorable for vegetation. Its mild temperature and humid atmosphere enable several delicate plants, which usually in the same latitude can be cultivated only in sheltered gardens, to flourish here with vigor in the open air; and frequently forest trees continue to retain their foliage after similar trees have lost their leaves in the warmest parts of England. The conditions would naturally indicate forests, and it seems that in early times, large tracts of magnificent timber were spread over its surface; but waste and mismanagement have prevailed, trees have almost disappeared except from the parks of the wealthy land-owners, and what ought to be among the best is about the worst wooded country in the middle latitudes of Europe. More attention is now being given to the subject of forestry; in 1901 there were 309,741 acres in Ireland under forest, a portion of which was a new growth. During that year, 1,740 acres were planted with trees, mostly fir, spruce, and larch. In 1917 the acreage was only 292,684, a decrease of 17,057 acres. Grass grows luxuriantly in nearly all parts of the island.

Animals.— The fauna of Ireland consists now of birds and small rodents. Animals once found here and mentioned in the ancient literature, as the deer, bear, wildcat, wolf, beaver, cattle peculiar to the island, and certain birds (including the garefowl), have all disappeared. There are no snakes nor toads in Ireland. Fish are plentiful in the streams and on the coasts.

Fisheries.— The salmon fisheries are very valuable, and are increasing in value every year. With an increased supply of fish, high prices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ATLANTIC OCEAN
NORTH CHANNEL
IRISH SEA
SCOTLAND
Campbeltown
Sheep I.
Sanda I.
Mull of Kintyre
Rathlin I.
Bloody Foreland
Tory I.
Inishbofin I.
Inishdooey I.
Gola I.
Owey I.
Aran I.
Rinrawros Point
Rosses Bay
Boylagh Bay
Trawenagh Bay
Gweebarra Bay
Gweedore Bay
Inishfree Bay
Dunmore Head
Loughros More Bay
Loughros Beg Bay
Glen Head
Glen Bay
Rosapenn Point
Malin Beg
Malin Head
Inishtrahull Sound
Garvan Islands
Glashedy I.
Tor Rocks
Inishtrahull I.
Dunaff Head
Lough Swilly
Fanad Point
Melmore Head
Horn Head
Sheep Haven
Dunfanaghy
Tory Sound
Ballyness Bay
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Boylagh Bay
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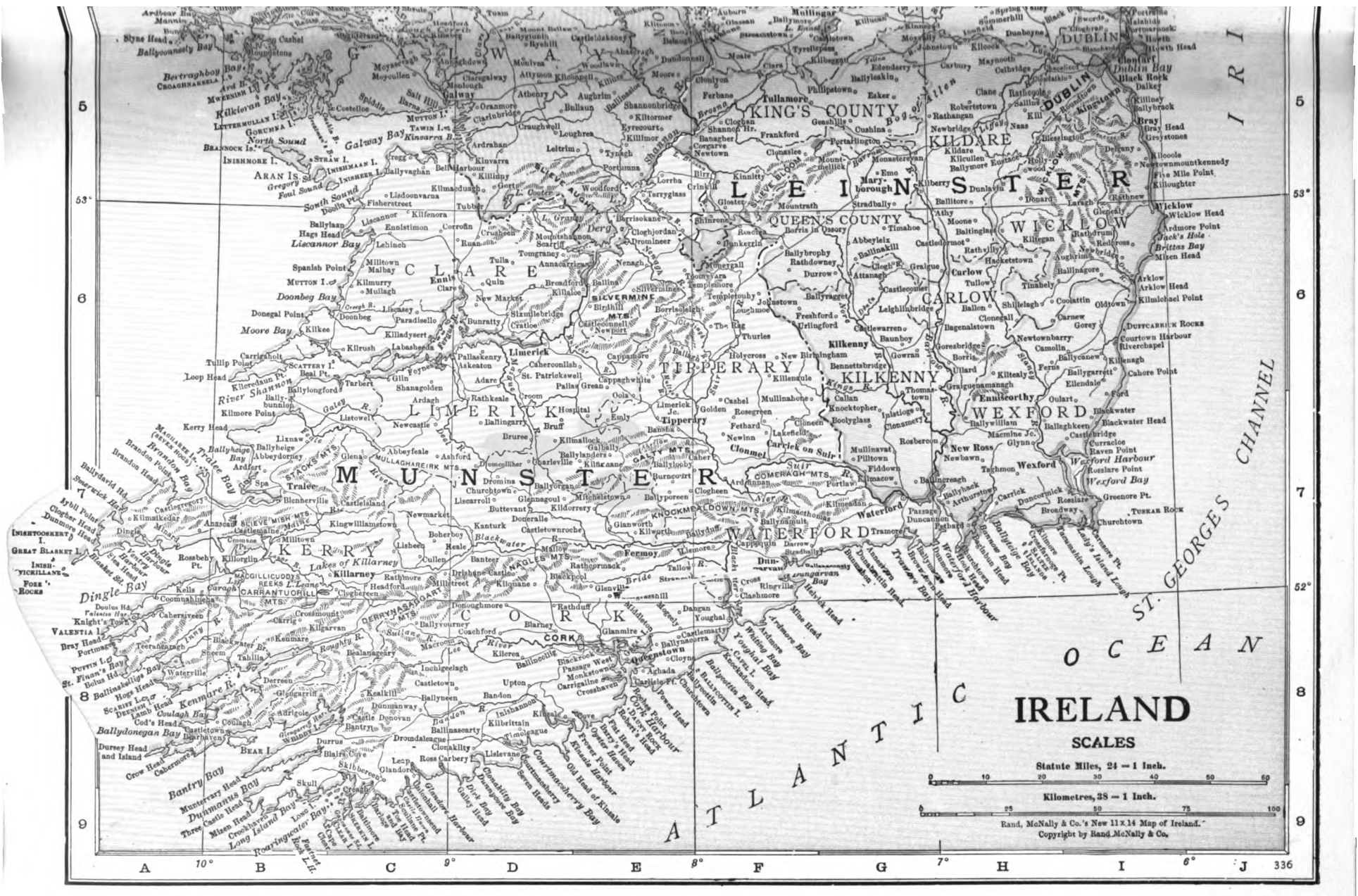
Gweebarra Bay
Dunmore Head
Loughros More Bay
Loughros Beg Bay
Glen Head
Glen Bay
Rosapenn Point
Malin Beg
Rathlin O'Birne I.
Carrigan Head
Muckros Head
St. John's Point
McSwynes Bay
Donegal Bay
Inver R.
Doorin Point
Belderg Harbour
Downpatrick Head
Benwee Head
Broadhaven
Erris Head
Termoncarragh
Eagle I.
Annagh Head
Inishglora I.
Pig I.
Kid I.
Kilmunmin Hd.
Lenadoon Point
Streedagh Point
Inishmurray I.
Ballyconnell Point
Sligo Bay
Ballysadare Bay
Dromore Bay
Killala Bay
Killala
Rathlackan
Rathfran
Ballycastle
Broadhaven
Stonefield
Ballyglass
Belmullet
Corraun Point
Inishkea North
Inishkea South
Black Rock
Blacksod Bay
Dooskeme
Achill Head
Keel
Doogort
Achill I.
Doogort
Camport Bay
Kildavnet
Achillbeg I.
Clew Bay
Newport Bay
Newport
Westport
Westport Quay
Murrisk
Louisburgh
Mweelaun I.
Caher I.
Inishturk I.
Inishdalla I.
Inishdoffin I.
Inishark I.
Killary Harbour
Cleggan Bay
High I.
Omey I.
Ardbear Bay
Manning Bay
Cuffen
Lettertrask
Leenane
Gowlaun
Ballinrobe
Neale
Cong
Shrule
Kilbennan
Tuam
Milltown
Glennamaddy
Raheen
Cloonee Bg.
Athleague
Roscommon
Rosdaul
Ballymoe
Stonetown
Dunmore
Ballindine
Holly Mount
Ballyglass
Ballycastle
Rathlackan
Rathfran
Killala
Killala Bay
Drumore
Kilglass
Inishcrone
Palmerstown
Castlereagh
Carrowmore L.
Bangor
Nephin Beg Mts.
Crossmolina
Derry
Deel R.
L. Conn
Foxford
Swinford
Charlestown
Castlebar
Manulla
Kiltamagh
Balla
Mayo
Derrinkee
Partry Mts.
Maam
Maamtrasna Mts.
Killary Harbour


IRELAND
SCALES
Statute Miles, 24 — 1 Inch.
0 10 20 30 40 50 60
Kilometres, 38 — 1 Inch.
0 25 50 75 100
Rand, McNally & Co.'s New 11 X 14 Map of Ireland.
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ATLANTIC OCEAN
IRISH SEA
ST. GEORGES CHANNEL
CONNAUGHT
LEINSTER
MUNSTER
ULSTER
GALWAY
CLARE
LIMERICK
TIPPERARY
KILKENNY
KING'S COUNTY
QUEEN'S COUNTY
KILDARE
DUBLIN
WICKLOW
WEXFORD
CARLOW
WATERFORD
CORK
KERRY
Galway Bay
Kilkieran Bay
Bertraghboy Bay
Clew Bay
Killary Harbour
Doonbeg Bay
Moore Bay
Liscannor Bay
Galway
Limerick
Tralee
Killarney
Cork
Queenstown
Dingle Bay
Tralee Bay
Ballydonegan Bay
Bantry Bay
Kenmare R.
Lakes of Killarney
Waterford
Wexford Harbour
Wexford Bay
Dublin Bay
Dublin
Aran Is.
Inishmore I.
Inishmaan I.
Inisheer I.
Valentia I.
Great Blasket I.
Inishtooskert I.
Inishvickillane
Fore Rocks
Skellig Rocks
Tuskar Rock
Saltee Is.
Arklow Head
Wicklow Head
Mizen Head
Brow Head
Loop Head
Kerry Head
Slyne Head
Bloody Foreland
Horn Head
Malin Head
Fair Head
Rathlin I.
Tory I.
Inishtrahull
Inishowen Head
Lough Foyle
Lough Swilly
Lough Erne
Lough Neagh
Lough Derg
Lough Ree
Lough Corrib
Lough Mask
Lough Gill
Lough Allen
Lough Conn
Lough Carra
Lough Arrow
Lough Key
Lough Gara
Lough Sheelin
Lough Ennell
Lough Owel
Lough Derravaragh
Lough Ennell
Lough Boderg
Lough Gowna
Lough Kinale
Lough Ramor
Lough Sheelin
Lough Derravaragh
Lough Owel

are maintained owing to the improved means of communication from remote districts with the best markets. In spite of this, however, these fisheries are not cultivated to anything like so high a degree as they might be. Still, the number of men engaged in the salmon fisheries in Ireland is over 13,000, the estimated value of the salmon exported being from $700,000 to $950,000 annually. The principal sea fisheries of Ireland are those of herring and mackerel. The herring fisheries in the Irish waters are prosecuted chiefly on the east coast by Irish boats from Howth, Arklow and other places on the Irish Coast, and by a fleet of vessels from Cornwall, Scotland, and the Isle of Man. The number of boats engaged in this branch of the sea fishery is much smaller than in Scotland, from which considerable quantities of cured herrings are imported. The total number of vessels engaged in the sea fisheries (1914) was 5,290, with a total net tonnage of 27,880; the number of men and boys employed being about 18,000. The native fishermen successfully compete with their rivals, yet the sea fisheries of Ireland on the whole have much declined, as shown by the decrease from 55,630 hands and 13,483 boats employed in 1860, to the figures just given. A large number of Irishmen are employed in the fisheries around the British coasts. See GREAT BRITAIN — FISHERIES.

Agriculture and Stock Raising.— The chief occupation is agriculture. The richness of the soil, its lightness that makes tillage easy, the large percentage of arable land, the amount of rainfall and the mildness of the climate all combine to make Ireland an agricultural country. Despite the great extent of moorland-wastes and the large amount of bog-land, few countries raise, in proportion to the area, such a large amount of food products year after year. But with natural advantages above the average, agriculture as a system has not progressed as in many other countries. The holdings, or farms, originally too small to be occupied by farmers of capital and enterprise, were in many cases subdivided until they were reduced to the smallest patches, on the produce of which a family could barely subsist. One result of this poor policy was that the holders were obliged to raise as much as possible each year, for immediate use, without regard to the ultimate effect of this mode of farming upon the land. Competent authorities say that this over-cropping has had a most deleterious effect upon the land. Yet by rotation of crops and the use of fertilizers the soil has been restored to a considerable extent. Statistics show that a change in the kind of crops has been gradually taking place; a decrease in the acreage under cereals and green crops and an increase in the area under meadow and clover. The following figures show the distribution of the cultivated area, given in acres, for 1917: Corn crops, 1,774,227; green crops, 1,138,913; flax, 107,566; fruit, 17,024; hay, 2,532,723. Pasture lands amounted to 11,500,000 acres. The value of food products imported in 1914 was over $136,000,000. The principal exports are live stock, bacon and hams, butter, poultry, eggs, potatoes, vegetables and flax, hides, skins, wool and feathers. Imports at Irish ports in 1915 were valued at $439,751,580, an increase of $69,777,920 over the previous year; exports were $422,317,040, an increase of $35,000,000 over 1914. During 1915 Ireland exported 17,808 horses, 841,587 head of cattle, 489,657 sheep and 179,058 pigs.

The number of holdings recorded in Ireland for 1916 was 572,045, held by 560,313 occupiers; of these, 195,285 were in Ulster, 134,237 in Munster, 124,866 in Leinster and 117,657 in Connaught. Of holdings not exceeding one acre, there were 107,807; between one and five acres, 48,900; between 5 and 15 acres, 127,775; from 15 to 30 acres, 124,097; from 30 to 50 acres, 72,304; from 50 to 100 acres, 57,510; from 100 to 200 acres, 23,192; from 200 to 500 acres, 8,435; above 500 acres, 2,025. These statistics are more reliable than those published in former years, when a holding that extended into several townlands was returned as so many different properties, though being in reality only one.

The Land Act of 1870 greatly improved the conditions of tenure in Ireland. The chief aims of the act were to provide compensation to tenants for arbitrary eviction, and especially for improvements effected by them on their holdings in case of their being disturbed in their possession by the landlords, and to afford facilities to tenants for the purchase of their holdings. The act legalized what is called the Ulster tenant-right custom in all the districts in which it prevailed, and decreed the amount of compensation to be awarded in absence of such custom. In 1881 it was supplemented by a more thorough and comprehensive measure. The benefits conferred on Irish tenants by this act were briefly summarized under the terms "fair rent," "fixity of tenure," and "free sale." By the first of these every tenant who objected to his rent, or the rent the landlord wished to exact, was entitled to have a "fair rent" fixed for him by a court. The rent was to remain unaltered for 15 years, at the end of which period it might be readjusted, and raised or lowered. By the principle of "fixity of tenure" the law recognized that the tenant had a certain right in his holding in virtue of which he was not to be arbitrarily removed from it without compensation, and which enabled him on leaving his farm to obtain the best price he could for yielding up his possession. The "free sale" of this right of tenancy was restricted only in so far as that it must be to one person only (except under agreement with the landlord) that the landlord might object on sufficient grounds to the person purchasing and that he also had the right of pre-emption. At the expiration of the 15 years the landlord might resume possession of the holding on paying the tenant compensation for improvements effected by him, and also paying him the value of his tenant-right, both being determined by the court should the parties be unable to agree. A tenant who sold his tenant-right on quitting his holding was not to be entitled to compensation for disturbance, or if he had received compensation he was not entitled at that time to sell his tenancy. The act also empowered the land commission to advance loans to tenants not exceeding three-fourths of the value of their holdings, to enable them to become proprietors, and such loans were repayable by an annual payment of 5 per cent for 35 years. Provision was also made for assisting emigration. A tenant whose holding, or the aggregate of whose holdings, were valued at

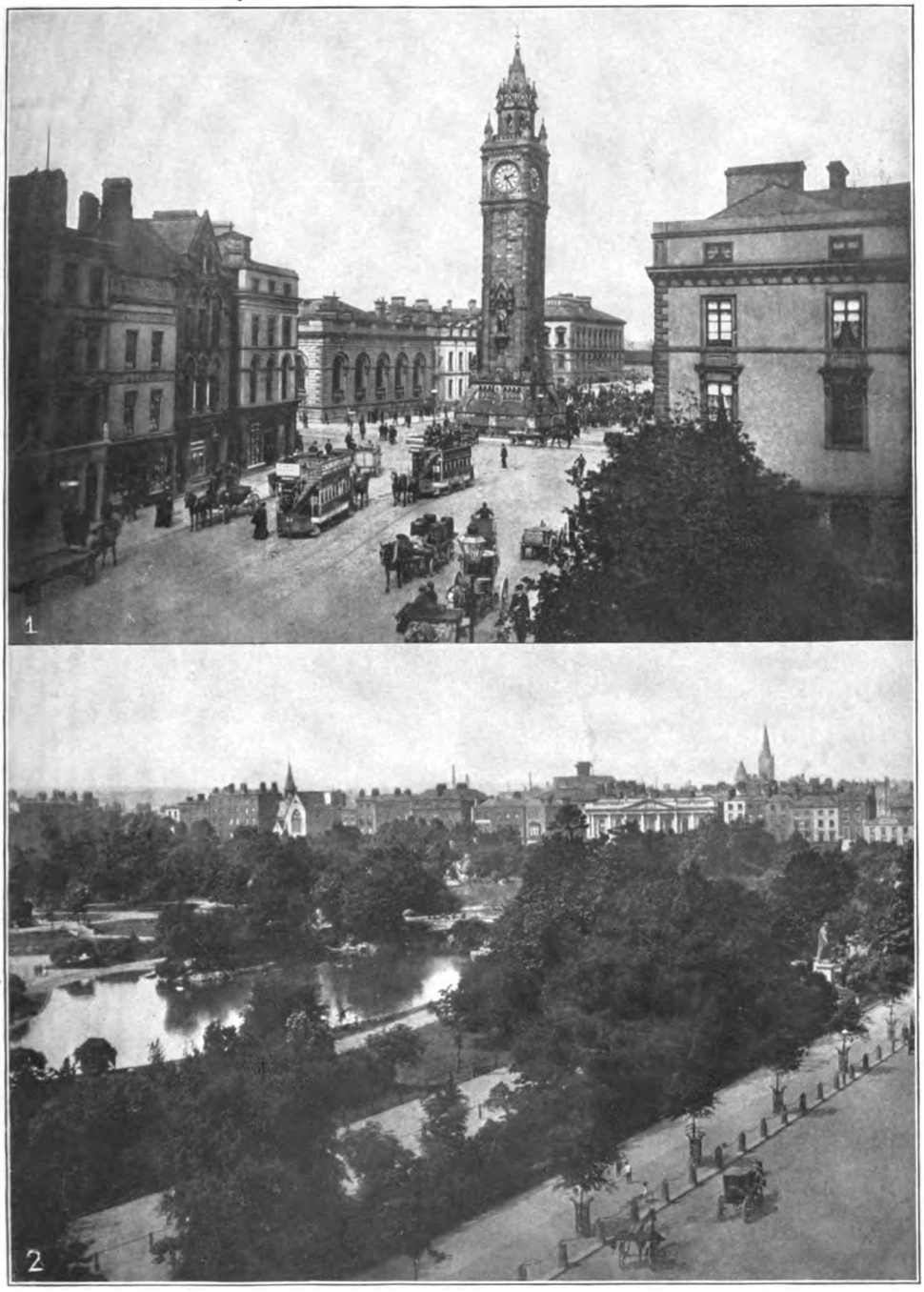
not less than $733.50, was entitled by writing to contract himself out of any of the provisions of this act, or of the act of 1870. Another act passed in 1885 extended the privileges conferred by the act of 1881, the Imperial government advancing $50,000,000 for land purchases. Another act passed in 1896 went farther in the same direction. The Purchase of Land (Ireland) Act of 1891 supplied the Land Commission with further funds for advances to tenants to enable them to purchase their holdings. But the Land Purchase Act of 14 Aug. 1903, whereby the tenants may buy the farms and become independent of the landlords, was a great beginning toward a readjustment of agricultural conditions. The new law provided that the actual tenants or persons, or persons who had been tenants within 25 years, could purchase all the land they occupied or desired at prices varying according to the condition of the property, to be paid for upon the installment plan, the seller accepting a mortgage for a term of years, the government guaranteeing the payment at the ruling rate of interest. Further improvements were introduced under the Land Act of 1909, by which the Congested Districts Board was created, and by the Laborers' (Ireland) Act of 1906 for the erection of laborers' cottages, for which purpose $22,934,105 had been advanced up to 31 March 1917, while the total amount advanced for land purchase up to that period stood at $492,658,055, of which $8,385,365 has been paid back by purchasers, leaving a sum of $484,272,690

Stock-raising has increased remarkably during recent years, and Ireland is to-day one of the best-supplied countries for its size in Europe in regard to live stock. In 1900 there were 491,156 horses, 4,608,550 head of cattle, 4,386,876 sheep, and 1,268,521 pigs. During the first war year Ireland exported 30,940 horses to Great Britain, as against 8,662 which came from the rest of the world; 945,410 head of cattle, as against 2,234 from elsewhere; 539,107 sheep, 147,924 pigs, 48,457 tons of bacon and over 6,000 tons of hams. Throughout the war Ireland contributed heavily in foodstuffs to Great Britain and her allies. In spite of this enormous drain on her live stock, Ireland possessed, in 1917, namely 600,000 horses, 24,746 mules and jennets, 228,628 asses, 4,907,466 cattle, 3,744,453 sheep, 947,572 pigs, 268,853 goats and over 22,000,000 poultry. England is the principal market for the cattle raised in Ireland. The breeds of horses vary with the locality; ponies are numerous in Connaught; hunters in the north of Leinster; and draught horses in nearly all the counties on the eastern coast. The reports of the Irish Agricultural Organization Society indicate that the agricultural co-operative movement is growing steadily and rendering valuable service. At the end of 1916 there were 1,040 co-operative farmers' societies, comprising creameries, credit banks, poultry keepers' societies, etc., with a membership of over 100,000 and a business turnover exceeding $30,000,000. The society has spent over $500,000 of private contributions in spreading co-operative organization among Irish farmers. The Department of Agriculture and Technical Instruction supplies traveling lecturers who give instruction in all branches of agriculture, dairying, bee-keeping and stock-raising. Besides numerous agricultural colleges and schools there are three agricultural stations for farm apprentices, while special classes are held in the winter months on rural domestic economy. Consult 'Ireland, Industrial and Agricultural' (Department of Agriculture and Technical Instruction for Ireland); Smith-Gordon and Staples, 'Rural Reconstruction in Ireland' (London 1918).

Manufactures and Trade.— The linen manufacture early took root in Ireland, and still continues to be its most important staple; and in every article, except lace and cambric, competes successfully with all other countries. It has increased in a remarkable manner within the last 40 or 50 years, and Belfast, its centre, has now become the first city of Ireland in population as well as in manufacturing industry. The linen manufacture, indeed, is of importance; a large number of the factories are in Ulster. The cotton manufacture has had a very different history, the number employed in this industry having declined steadily from 1868. The woolen manufacture appears at the outset to have outstripped that of linen. It had at least made such progress as to alarm the woolen manufacturers of England, who, in a spirit of petty jealousy, petitioned the English parliament for its discouragement, and succeeded. The Irish were prohibited from sending their woolens abroad, and could not even send them into England without paying an oppressive duty. Had the manufacture been suited to the country it might have surmounted all this absurdity and injustice; and, at all events, when these ceased to operate, would have revived. But the woolens of Ireland continue to be of very secondary importance, and indeed the manufacture seems to have much decreased in recent years. The tweed has retained its popularity. The manufacture of Irish poplins (of woolen and silk, or woolen and flax or cotton) is very flourishing. There are about 20 mills engaged in paper making. The brewing of beer and distillation of whisky form important items in the national production. The making of shirts and other clothing for men is a growing industry. During the later years of the 19th century shipbuilding became quite prominent. The largest yards are at Belfast, where some 14,000 men and boys are employed. The vessels of the White Star line are all built in Belfast, where 21 vessels were launched in 1914, with a gross tonnage of 239,819, not including warships. Later statistics are not available. Shipbuilding and repairing are also carried on at Dublin, Londonderry and Haulbowline. Home industries still flourish; and the Irish hand-made laces and embroideries are still popular.

Commerce.— That of Ireland is not at all proportioned to her natural capabilities, and to the admirable facilities afforded by the excellent harbors situated on her coasts. The laws made by the British government to destroy the commerce of Ireland account in a large measure for the present condition of trade. The most important articles of export find a market in Great Britain. They consist, beside agricultural produce, of manufactured articles, particularly linen, but as the bulk of such articles is very small in comparison with their value, the trade, or at least the shipping connected with them, holds only a secondary place. The trade with foreign

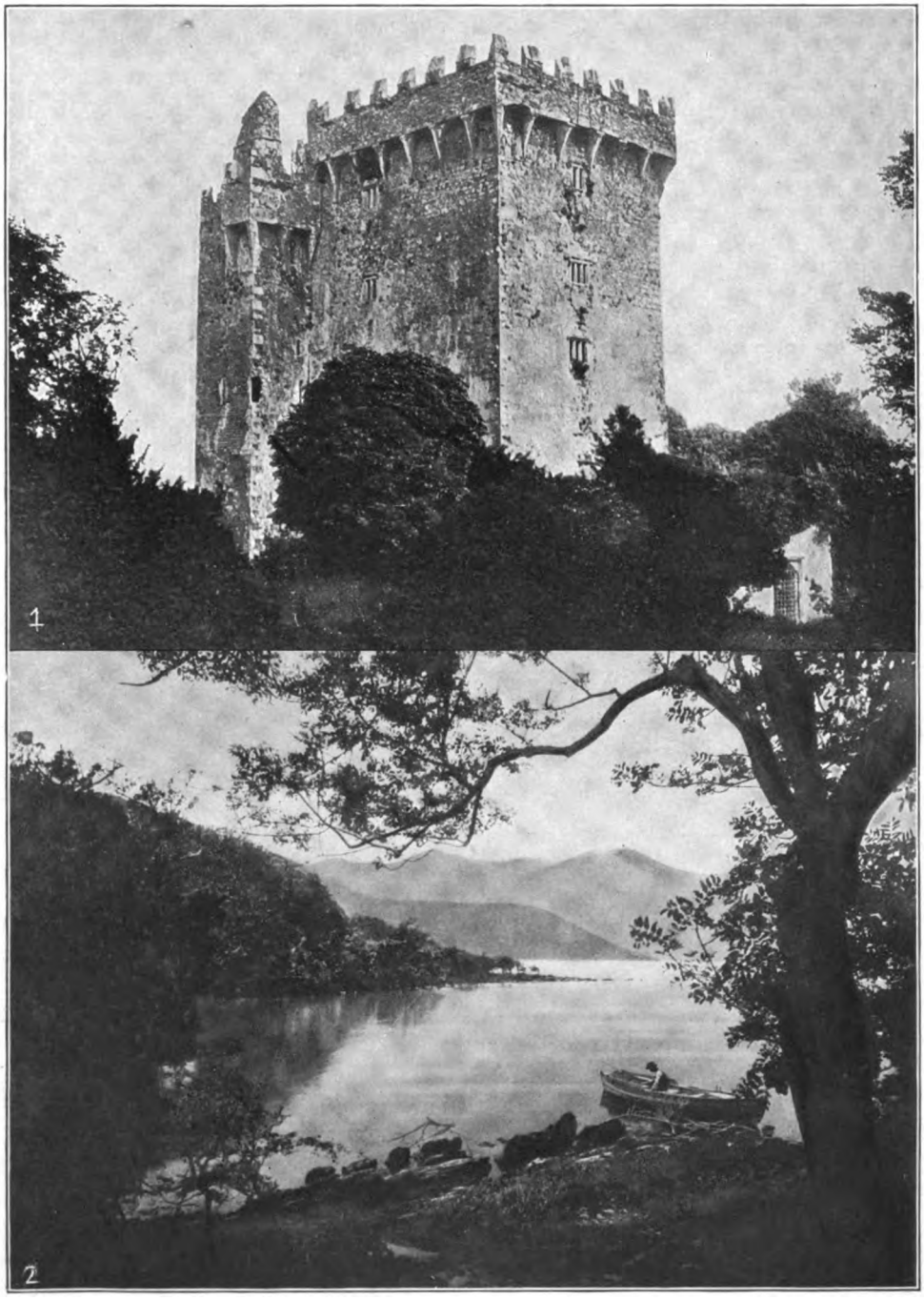
IRELAND



1 Albert Memorial, Belfast

2 St. Stephen's Green Park, Dublin

IRELAND



1 Blarney Castle

2 Innisfallen, Lake Killarney

countries is also inconsiderable. The principal imports are colonial produce, woolen and cotton goods, wheat, wool, coal and salt. Of the shipping employed in this trade only a mere fraction is Irish. Belfast, Cork and Dublin are the chief shipping ports. In 1913, the last normal year, the total tonnage of British and foreign shipping entered at Irish ports was as follows: Cork, 1,140,578; Belfast, 516,654; Dublin, 237,080; cleared, Cork, 572,945; Belfast, 132,906; Dublin, 34,363. These figures do not include coasting trade. See GREAT BRITAIN — COMMERCE.

Transportation.— The rivers of Ireland form excellent navigable channels. In several of them, however, when the water was low, the navigation became seriously impeded by rocky shoals. In removing these, or in making artificial cuts for the purpose of avoiding them, vast sums have been expended. Improvements of equal importance have been made by the construction of canals; but since the introduction of railroads, canals have in Ireland, as elsewhere, sunk to a position of secondary importance. There are 848 miles of canals, mainly owned by railway companies. Close on a million tons are carried annually over these waterways, producing a revenue of about $700,000. The principal canals are the Grand Canal, 165¾ miles in length; the Royal Canal, 96¼ miles; the Barrow Navigation, 42¼ miles; the Newry Navigation, 35 miles; the Lagan Navigation, 26¼ miles. With the exception of the Barrow Navigation, the Grand Canal and the Lagan Navigation, the dividends paid by the Irish canals in the possession of public companies are almost nominal. The Royal Canal yields a profitable return, but it is merged in the Midland Great Western Railway. The Grand and Royal canals connect the important systems of the Shannon Navigation, in all 158 miles in length, with Dublin. The railroad system of Ireland has attained a considerable development. The roads are all constructed on a gauge of five feet three inches, which is compulsory. The average cost of construction, including carrying stock, is about $80,000 per mile. The principal railroads are the Northern Counties Railway, with a total length of 250 miles; the Dublin and South Eastern Railway, 170 miles in length; the Great Southern and Western, 1,092 miles; the Midland Great Western Railway, 546 miles (including the Dublin and Meath, Great Northern and Western, etc.); and the Great Northern of Ireland, 540 miles (including the Dublin and Belfast Junction). The most profitable of them are a short one connecting Dublin with Kingstown, and the Northern Counties. The total length of railways open for traffic in January 1914 was 3,409 miles. The capital of Irish railways at the end of 1916 was $198,385,000; receipts for that year $26,555,000.

Public Works.— Large sums have been advanced in loan by the sanction of the imperial Parliament under various acts for public works and improvements in Ireland. The Irish Board of Public Works has charge of such grants and their expenditure; the objects to which they are applied include landed improvements and drainage, fishery piers and harbors, roads, bridges and public buildings, tramways, light railways and certain lines of inland navigation and the preservation of ancient monuments. The commissioners have authority to lend for the purpose of any work for which county or borough councils are authorized to borrow. The largest item of their expenditure has been devoted to the improvement of lands, river drainage and navigation, while numerous grants are made for the upkeep of public institutions, roads, bridges and docks, reclamation of lands, dwellings for the poorer classes, teachers' residences, dispensaries, public health service, etc.

Money, Weights and Measures are the same as in Great Britain.

Banks.— The Bank of Ireland has a royal charter and lends money to the government. It manages, free of charge, all the public debt of Ireland. There are nine joint-stock banks with 693 branches in Ireland, all of which have adopted limited liability. On 31 Dec. 1915 the deposits in these banks amounted to $334,015,000. There are two kinds of savings banks in Ireland, one being the trustee savings bank, which has been in existence since the first years of the 19th century, and the other, the postal savings bank, instituted in 1861. In the former the deposits (at 31 Dec. 1915) amounted to $12,450,000; in the latter, $58,905,000. At the same time the amount of government stocks on which dividends are payable at the Bank of Ireland was $234,680,000, an increase of $24,470,000 in the year. The only clearing-house in Ireland is in Dublin. See GREAT BRITAIN — BANKING.

Finances.— In the financial year 1913–14 the total revenue contributed by Ireland amounted to $55,672,500 and the local expenditure to $61,785,000, showing a deficit of $6,112,500. In 1916–17, owing to increased war taxation, the total revenue rose to $118,832,500, while the local expenditure was $63,430,000, leaving a surplus of $55,402,500 available for imperial expenditure. The Civil Service Estimates for 1918–19 provided for the following expenditure on Irish administration: Salaries, $2,972,535; law courts, land commission, police, prisons, reformatories, etc., $14,481,330; education, universities, National Gallery, science and art, $12,777,660. Under the Old Age Pension Acts 1908–11, there were 198,938 pensioners in Ireland, or 59,506 more than in Scotland and Wales put together. The amount paid on old age pensions in Ireland is approximately $12,500,000 per annum.

Charities.— The Poor Law, which regulates the system of public charities, is about the same for Ireland as for England and Scotland. It provides for relieving the needy in their own homes or for placing them in charitable institutions. The law is administered by the local government board through boards of guardians elected for the purpose. The number of indoor poor who received assistance for the year ending March 1916 was 32,095, and of outdoor paupers 36,658, representing one in every 63 of the estimated population of the country, as compared with one in 43, 11 years earlier. The total expenditure on poor relief for the year amounted to $6,789,190. In January 1915 the total number of adult able-bodied poor (indoor relief) was 3,437; all others in the same class were 29,757; those in receipt of outdoor relief numbered 38,072; in asylums, 1,653; total, 72,919. A large amount of aid is dispensed through private means; but a strong effort is being made to remove the causes, which are about the same in all countries and which usually result in

poverty. Efforts are being made to improve the methods of work and to foster habits of economy.

Emigration.— In 1851 the government began to collect emigration statistics for Ireland, and the total number of emigrants who left Ireland from that year to the end of 1916 was 4,316,602, almost equally divided between males and females. The years of greatest emigration were 1851–54, 1863–65 and 1883, the total for each of these years being over 100,000. The following are the figures from 1900 to 1916: 1900, 45,288; 1901, 39,613; 1902, 40,190; 1903, 39,789; 1904, 36,902; 1905, 30,676; 1906, 35,344; 1907, 39,082; 1908, 23,295; 1909, 28,676; 1910, 32,457; 1911, 30,573; 1912, 29,344; 1913, 30,967; 1914, 20,314; 1915, 10,659; 1916, 7,302. Of the last-mentioned year, 1,515 were from Leinster, 1,056 from Munster, 2,733 from Ulster and 1,998 from Connaught. The largest proportion went to the United States, 485 to Canada, 100 to Australia, 27 to New Zealand and 19 to South Africa.

Government.— Ireland, by the Act of Union, became an integral part of the United Kingdom and shares in its legislation by means of 28 representative peers in the House of Lords and 103 representatives in the House of Commons. The representative peers are elected for life by the whole body of Irish peers. The Lord-Lieutenant, who represents the sovereign, holds his court in the castle of Dublin. He is appointed by the Crown, receives $100,000 per annum and holds office during the continuance of the government under which he is appointed. Although the Lord-Lieutenant is the official head of the executive government, the Secretary of State for Ireland, who usually sits in the Cabinet, virtually controls all Irish administration, while the Inland Revenue, Customs and Excise, and the Post Office are controlled from their respective headquarters in London. The Treasury Remembrancer's Office in Ireland, the Irish Board of Public Works and the Irish Valuation Office are under the Imperial Treasury, which also controls the Irish Commission under the National Insurance Act. The Board of Trade has branches in Ireland to deal with the mercantile marine, the Royal Naval Reserve and the employment exchanges. Since 1898 great changes have been made in the manner of administering the local government. Previous to that date the chief authority in the county was the grand jury, and all local affairs pertaining to the government and local laws were attended to by the grand juries and presentment sessions. The act of 1898 provides for a council, elected by the people, for a term of three years, women being equally eligible with men. The government of the boroughs, rural and urban districts, is also vested in an elective council. The unincorporated boroughs are governed by commissioners.

The government of the incorporated boroughs is vested in a mayor, aldermen and council. The large cities are now county boroughs. The chief secretary, the under-secretary and four commissioners, who are appointed by the Lord-Lieutenant, constitute the local government board, which has supervisory authority over the local council. This board approves or rejects nominations made by the local authority, decides upon salaries and has the whole local government in charge to a certain extent.

The judiciary of Ireland is similar in many respects to that of England. The highest tribunal is the Supreme Court of Judicature, composed of the High Court of Justice and the Court of Appeal. Other courts are the Court of Bankruptcy, the Land Commissioner's Court and the High Court of Admiralty. The English municipal law is administered by the courts of Ireland. The remaining public services in Ireland are either wholly or partly under the Irish government; their official heads, whether paid or unpaid, are appointed by the Crown or by the Lord-Lieutenant, and with few exceptions are wholly maintained or assisted out of the annual parliamentary votes. With the eventual introduction of Home Rule (q.v.), considerable changes will occur in the system of administration.

Population.— Since the census of 1841, when the inhabitants of Ireland numbered fully 8,000,000, the population has almost steadily decreased. In 1846–47 a frightful famine, occasioned by the potato disease, broke out, and was followed by a visitation of fever and cholera. The population was in consequence greatly reduced, and since then emigration has taken the place of famine and disease in reducing it further. (See above, *Emigration*). From the causes just referred to the total population of Ireland, which might by natural increase have been 10,000,000, has dwindled away to 4,390,219 according to the census of 1911. In the 70 years the population per square mile had fallen from 251 to 135. The estimated population at 30 June 1916 was 4,337,000. The last decennial census revealed 2,192,048 males and 2,198,171 females. Of the adults 1,191,142 were or had been married, the numbers being 589,861 males and 601,281 females, while 91,523 males and 204,740 females were widowed, a total of 296,263. Those who were born in Ireland made up 96.4 per cent of the population. The religious distribution was as follows:

		Percentage
Roman Catholics	3,242,670	73.9
Church of Ireland	576,611	13.1
Presbyterians	440,525	10.0
Methodists	62,382	1.4
Other denominations	65,652	1.5
Not stated	2,379	0.1
	4,390,219	100.0

The population by provinces in 1911 was as follows: Leinster, 1,162,044; Munster, 1,035,495; Ulster, 1,581,696; Connaught, 610,984. There were six county boroughs with populations as follows: Dublin, 304,802; Belfast, 386,947; Cork, 76,673; Limerick, 38,518; Londonderry, 40,780; Waterford, 27,464.

Education.— The present difficulties in establishing a public system of education in Ireland had their origin in the times following the efforts to make the people abandon the Roman Catholic Church. As a consequence, the parents refused to patronize the government schools. The laws of the time of William III and Queen Anne made it a crime for Catholics to teach or to have their children taught by Catholics, or to send them abroad where they would be educated in Catholic schools. The rigid enforcement of these laws resulted in a large proportion of illiteracy among the Roman Catholics, although they had established schools abroad which were

attended by those with wealth sufficient to live in a foreign country. (Consult 'History of Irish Schools and Scholars of the Middle Ages'). The principal educational institutions in Ireland are Dublin University (Trinity College), the National University of Ireland (with three constituent colleges at Dublin, Cork and Galway) and the Queen's University of Belfast. Saint Patrick's College, Maynooth, is a recognized college of the National University, which was founded in 1908. The Royal College of Science for Ireland was established under the authority of the Science and Art Department, London, in August 1867. Together with the Metropolitan School of Art and the Irish Training School of Domestic Economy it is controlled by the Department of Agriculture and Technical Instruction. Its object is to supply a complete course of instruction in science applicable to the industrial arts and to aid in the instruction of teachers for the local schools of science. There are professors of physics, chemistry, botany, zoology, agriculture, mining, geology, applied mathematics, etc. There are also several theological colleges for the training of Roman Catholic and Protestant clergy; the General Assembly's Theological College, Belfast, the Magee College, Londonderry, a Presbyterian college opened in 1865 and embracing in its curriculum literature, science and theology, the College of Saint Columba, near Dublin, founded for the purpose of establishing a system of instruction preparatory to the university.

The Catholic University in the city of Dublin, established in 1854, granted degrees in theology and philosophy, and after 1883 was under Jesuit control. In 1908 it was reorganized as a constituent college of the National University and is now known as University College. There are additional, in different cities and towns, about 40 Roman Catholic colleges and seminaries for men and a large number of academies or secondary schools for women. There are numerous non-sectarian schools, some of them of royal and private foundation and endowed, but the most prominent are those established since 1831 under the superintendence of the commissioners of national education. These schools are open to the children of parents of all denominations. The pupils are not required to attend any religious exercises or religious instruction of which their parents or guardians disapprove, and opportunity is given to pupils of each religious persuasion to receive separately at appointed times such religious instruction as their parents or guardians may approve of. Of these schools there were 8,118 in operation in 1916, with 679,762 pupils on the rolls. The average daily attendance was only 494,318. The number of principal teachers was 7,687, with 5,734 assistants and junior teachers. In 1892 an act was passed by which a beginning was made of free education and a modified system of compulsion. In 1878 an act was passed for the promotion of the intermediate secular education of boys and girls in Ireland. By this act about $5,000,000 from the Irish Church surplus fund was set apart, being invested in commissioners who are to apply the revenue arising from it to the purposes of the act, these being (1) the carrying on of a system of public examinations; (2) the awarding of exhibitions, prizes and certificates to students; and (3) the payment of results fees to the managers of schools fulfilling certain prescribed conditions. The schools referred to in the act are of secondary or high school grade. The subjects of examination are Latin and Greek, modern languages, Irish, natural science, mathematics, etc.

Considerable attention is given to technical instruction. In all the convent schools the young girls have regular courses in domestic science, and in several trades are taught. The Department of Agriculture and Technical Instruction, which now controls this branch of education, has an advisory board of technical instruction. In 1901–02 the course of experimental science had been adopted in 152 schools with 6,412 science pupils. Throughout the provinces the work is being organized by the councils of county boroughs, urban districts and counties. See GREAT BRITAIN — EDUCATION.

Language and Literature.— The predominant in the Irish literature is the heroic, pathetic, love of nature, romance, virtue and through all runs the traditional. Although the Ogham, a system of writing, was introduced into Ireland about 13 centuries before Christ, yet the literary productions were transmitted orally. Hyde says, "The love of literature of a traditional type, in song, in poem, in saga, was more nearly universal in Ireland than in any other country of Western Europe."

The modern literature of Ireland, or the literature produced by Irish writers of the last centuries, has been included under English literature because the language used is English. See CELTIC LANGUAGES; CELTIC LITERATURES; GAELIC LITERATURE; IRISH LITERARY REVIVAL; IRISH LITERATURE IN ENGLISH; IRISH SCHOOLS AND SCHOOLMEN OF THE MIDDLE AGES.

Music.— See IRISH MUSIC.

Architecture.— Many of the ancient types of architecture extinct in other lands may still be found in Ireland. Their buildings and home life remained practically undisturbed for centuries; no ancient Roman architecture is found on the island. When Christianity was introduced, the change in form of the Druid temple was for several centuries in accordance with the natural development of the people, except the addition of the small cross, the windows facing the east and the altar. When the building became too small a new one was erected beside it. Some of the existing ancient specimens are a group of stone buildings on Skellig Michael, a rock rising precipitously out of the sea to the height of 700 feet, and about eight miles due west of the nearest headland in the County Kerry. The approach is by a flight of stone steps. Dry rubble masonry forms the walls, and in this group, as in others, the absence of the arch shows its ancient origin. It is oval outside, bee-hive in form, but rectangular within. The door has a horizontal lintel, above which is a small cross worked into the stone wall. The six cells in the interior, the common room for prayer (choir), the chapel, all show it was occupied by monks. The doors, with inclined jambs and horizontal lintels, antedate the arch. A wider lintel above, or the double lintel, indicates progression in architecture, a method of relieving the pressure of the roofs. The roofs of the ancient buildings were of stone. There are many of these ancient ruins, some in a good state of preservation.

Off the coast of Sligo, at Inishmurray, on the Isles of Aran, on islands off the coast of Kerry, and in many places are found buildings of dry rubble masonry. The change shows itself when cement is used and the walls become perpendicular as at Gallarus, in Kerry, and a further advance is shown in Saint Declan's oratory, in Ardmore, with square perpendicular towers, or, more properly, supports at the corners. Some of these were erected in the 6th, 7th and 8th centuries. Saint Colum-Cille's monastery at Kells was built about 807 A.D. In the 'Annals of the Four Masters' mention is made of the church Saint Kevin, founded in about 1108, and which is still in existence, at Glendalough. The Romanesque style makes its appearance in the 11th century; the earliest example is in Saint Flannan's, at Killaloe. Brian Boroimhe is said to have built churches at Killaloe, in County Clare. A church built about this time, at Freshford, the ancient Achadh-ur, eight miles northwest of Kilkenny, is still in use. At Clonfert Cathedral, in County Galway, there is a fine example of an Irish Romanesque doorway. This church is said to have been founded by Saint Brendan, "the navigator." The interlaced patterns on the piers, the ornamented column, are all most beautiful. "There is not," says Mr. Brash, "a square inch of any portion of this beautiful doorway without the mark of the sculptor's tool, every bit of the work being finished with the greatest accuracy." The Cathedral at Ardmore, County Waterford, shows another advance in its decoration; here may be seen The Judgment of Solomon, Adam and Eve, The Magi bringing their gifts, the stable indicated by a cow, etc. Many of the modern cathedrals are most beautiful.

The "Round Towers" of Ireland have been for years subjects of study and discussion. There exist in Ireland, in whole or in part, about 100 of those towers; 18 are in a perfect condition. Many claim that the Round Towers are of pre-Christian origin, and cite the similar towers, two in Scotland, seven on islands off the coast, one on the Isle of Man and a few on the Continent as examples of pagan architecture. Their average size is 100 feet in height, circumference at base, 50 feet, walls at door lintel, 3½ feet. The interior is divided into from four to eight stories. Petrie, who has studied the subject with care, claims that the towers are of Christian origin and were used both as bell towers and as safes or places in which to deposit the Church treasures. The Irish name for the towers, *Cloigtheach*, which means "house of a bell," supports the theory of Petrie and others. Petrie advances other and strong arguments in support of this theory. The 'Annals of the Four Masters' mentions the bells in some of the towers. One of the finest examples of a Romanesque doorway in a Round Tower is at Kildare. Some of the ancient pottery shows skill and artistic merit. In designing and coloring the ornamentation of the old Celtic manuscripts show great artistic power. The initial letters are most beautiful, especially in the 'Book of Kells,' a copy of the four Gospels in Latin, and in 'Annals of the Four Masters.' The symbolism used by other early nations is not found in the works of the ancient Irish. The designs are geometrical patterns, interlaced ribbon work, diagonal and spiral lines, strange animals, peculiar birds and the key pattern. The ancient metal work shows unique and beautiful designs; the bell shrines, the brooch of Tara and many pieces of old metal work may be seen in museums. The laces of Ireland, revived the last of the 19th century, show most intricate and charming patterns. Sculpture and oil painting are modern arts in Ireland, and in both many of Irish birth have excelled.

Art. See IRISH ART.

Religion.— The first authentic account of the introduction of Christianity into Ireland was in the 5th century, when Pope Celestine sent Germanus, bishop of Auxerre, and later, in 431, Palladius as bishop. Both Germanus and Palladius found on the island believers in Christianity, but no organized body of Christians. However, the chief work of conversion and organization was accomplished by Saint Patrick, who, good authorities state, was sent to Ireland by the same Pope. Killpatrick, a town of Scotland, is said to have been Patrick's birthplace, but some authorities claim that he was a native of France. He had been consecrated bishop before coming to Ireland as a missionary, and he selected Armagh as his see. A large number of converts were made, so many that even before Patrick died he had other bishops and a number of priests to assist him. The Roman Catholic Church in Ireland has four archdioceses and 23 dioceses. The archdioceses are Armagh, Dublin, Cashel and Tuam. The Roman Catholic clergy and churches are all supported by voluntary contributions. The college at Maynooth, for the education of those studying to become priests, was founded in 1795. There are several other Roman Catholic ecclesiastical seminaries and colleges. See GREAT BRITAIN — CHURCHES OF ENGLAND, etc.

The Reformation never made much progress in Ireland, and though the Church of Ireland (Protestant) was established by law, it was only the church of a small minority. In 1869 it was disestablished. Previous to this time the clergy were supported by a tithe rent-charge, the proceeds of the church lands, etc., the total annual income of the Church, including the value of houses and lands in occupation, being about $3,068,920, while its entire capital was estimated at $70,000,000. By the above act, taking effect from 1 Jan. 1871, the position of the Church and clergy was entirely changed, though those holding benefices at the time of its passing have not suffered loss. All real and other property formerly belonging to the Church are now vested in commissioners, who pay to all deprived of income by the act, so long as they continue to discharge the duties of their offices, such an annual sum of money as they would otherwise have received, deduction being made of curates' salaries and other outgoings to which the parties would have been liable, and regard being paid to the prospective increase of incomes by the falling in or cessation of such charges; or instead of an annual sum, an equivalent single payment has been paid to such as have commuted their claims in that manner. The Church of Ireland accordingly is no longer a state church, and none of its bishops have now a seat in Parliament. It is still a vigorous and flourishing institution, however, and possesses funds amounting to over $47,000,000. Of this, upward of $30,000,000 have been voluntarily contributed

by friends of the Church since it was disestablished. While disestablishing the Irish Church, the act at the same time declared the cessation of the Maynooth grant and the *Regium Donum*. Maynooth College received $1,900,000 compensation for loss of the grant. The affairs of the Church of Ireland are now managed by the diocesan synods and by the general synod in conjunction with the representative body. The supreme legislative powers reside in the general synod, which meets in Dublin, and is composed of the archbishops of Armagh and Dublin and the 11 bishops, and of lay and clerical representatives from the different dioceses; the lay representatives being more than twice as numerous as the clerical. The representative body incorporated in 1870 consists of the archbishops and bishops ex officio, 39 lay and clerical elected members (three for each diocese), and 13 co-opted members elected by the other two classes conjointly. This body is empowered by its charter to hold church property, subject to the regulations of the general synod. The Church uses the Book of Common Prayer, as revised in accordance with statutes passed by the general synod, and furnished with a preface containing an exposition of its formularies in the sense in which they are understood by the Church.

The Presbyterian Church of Ireland is chiefly confined to the province of Ulster, where it may be said, more especially in the counties of Down and Antrim, to be the leading religious denomination. Its ministers are supported by voluntary contributions, seat-rents and church funds. They were formerly aided by an annual grant from government, called the *Regium Donum*, the amount of which, paid in 1869, was $202,735. This annual grant, however, was abolished, as already mentioned, by the Irish Church Act of 1869, and was commuted to a single sum of $3,506,860 paid to the church. For religious statistics see above — *Population*.

History.— The beginning of the history of Ireland is, like that of all European nations, enveloped in fable. Among the ancients it was known at least as early as the time of Aristotle, who calls it *Ierne*. In Diodorus Siculus it is called *Iris;* in Strabo, *Ierne;* in Pomponius Mela, *Iverna;* in Pliny, *Hybernia*. Plutarch calls the island *Ogygia,* meaning very ancient, and says: "They drew their history from remote antiquity, so that of other nations is new compared with them." Yet the information to be found about Ireland in the works of the ancient geographers and historians is altogether very scanty. The bardic historians of the country speak of Greek and Phœnician colonies, and lists of kings, for which there is some probable foundation. The vernacular language of the Irish proves that they are a part of the great Celtic race which was once spread all over Western Europe. The first probable records of the Irish people show that for the times they were advanced in civilization. The ancient bards were called *Filidhes* or *Feardanos*. Cæsar mentions in his 'Gallic Wars' their advancement. Pliny, Cæsar, and other authors say that the Druids who inhabited Ireland were learned; they knew philosophy and the sciences. In the Irish chronicles we find that in the reign of Eochy the First, more than a thousand years before the birth of Christ, "society was classified into seven grades, each marked by the number of colors in its dress, and that in this classification men of learning, that is, eminent scholars, were by law ranked next to royalty." Another proof of the existence of an ancient civilization, marvelous for its time, was the institution of Feis Teomran or the Triennial Parliament of Tara. The monarch, Ollav Fola, who reigned as Ard-Ri, or high-king, of Erinn, about 1,000 years before Christ, established this parliament. The subordinate royal princes or chieftains, constituted one branch; the Ollavs or scholars, and bards, law-givers, judges and historians, another branch; and the third consisted of the military commanders. Under the Ard-Ri, or high-king, were the kings of the provinces, and under each king were the clans who were governed locally by a chief, each clan selecting its own. Wars were frequent, as fighting and bloodshed were common pastimes throughout the then known world. The battle was the final court of appeal, and in most instances the first court of trial. A cause of dissension in Ireland, as in Great Britain and other countries, was the antagonism existing among people of different races. The Milesians, the Tuatha de Danaans, and the Firbolgs (q.v.) were distinct races centuries after the Milesians landed in Ireland. The differences among themselves seem not to have seriously affected their union when attacked by a common foe; as at the birth of Christ, when Rome was mistress of nearly all of Europe, she had never gained possession of Ireland. The introduction of Christianity into Ireland was not attended with bloodshed as in many other countries: indeed, afterward the nation seems to have enjoyed a season of repose from strife, although southern Europe was being overrun with the Germanic hordes. This repose favored the growth and expansion of Christianity and the progress of learning. The schools and monasteries founded by Saint Patrick and his bishops in the 5th century became the centres from which went forth many scholars; and even as early as the 6th century, Ireland became the seat of Western learning; and its monasteries were the schools from whence missionaries who disseminated the Christian faith throughout continental Europe proceeded. In the 8th and 9th centuries the scholars of Ireland were among the most distinguished at the courts of the kings, especially at that of Charlemagne, but when the Northmen commenced their descents some of the schools were destroyed and the monks dispersed. The ravages of the Danes at this period had results different from the attacks of the Romans. The continued attacks for nearly two centuries fostered internal dissensions, when in the beginning of the 11th century Brian Boroimhe (Brian of the Tribute) united the greater part of the island under his sceptre, restored public tranquillity, and subdued the northern invaders. After a contest of about 20 years he conquered Malachy, the brave warrior who "wore the collar of gold" won from the Danish invader, and became Ard-Ri of all Erinn. After the death of Brian, the island became a place of dissension; frequent wars rendered it weak against a foreign foe. This condition was largely the result of the divisions, made by Brian, of the island among his three sons. At this time Henry II of England, professing love

for Ireland and a great desire to restore peace, sought to gain possession of the island. This was the beginning of the Anglo-Norman invasion of Ireland. Henry II claimed to have received from Pope Adrian IV a bull authorizing him to take possession of Ireland. (The authenticity of this bull is very doubtful). After some delays occasioned by internal troubles in England, Henry attempted to gain possession of Ireland. For many years after the history of Ireland was a record of persecution, confiscation of lands, and attempts to wrest from the people inalienable and hereditary rights. So great was the resistance that in the 14th century, at the time of Richard II, the authority of England extended practically over only a small portion of country on the eastern coast, called "The Pale" (q.v.). This was governed by various nobles subject to a viceroy. The subjection was, however, sometimes little more than nominal. The nobles quarreled among themselves, and were very often at open feud. The beginning of the reign of Edward III (1327) was marked in Ireland by the outbreak of civil strife in every part of the English "Pale," advantage of which was taken by the Irish for a general rising, which threatened the safety of the English colonies, and which the government found itself unable to subdue, until it yielded to the demands of the barons in Ireland, by granting them complete civil and military jurisdiction in their own districts. During the wars with France some Irish troops served in the English armies, and the common sympathies induced by that circumstance seemed likely to promote a better state of feeling between the two races, when the breach was made wider than ever by the celebrated statute of Kilkenny (1367), framed under the viceroyalty of Lionel, duke of Clarence, son of Edward III, forbidding, under severe penalties, intermarriages between English and Irish, the assumption of Irish names by persons of English blood, the use of the Irish language, the native (Brehon) law, etc. In consequence of this the disturbances between the Irish and English inhabitants of Ireland increased so greatly that the English viceroy found it necessary to protect The Pale by payments of money to the Irish chiefs, and this state of matters continued during the reigns of Richard II, Henry IV and Henry V, until, in that of Henry VI, when Richard, duke of York, was appointed governor of The Pale and succeeded by his politic measures in restoring peace. In the reign of Henry VII (1495) was passed Poyning's Act (so called from Sir Edward Poyning, lord-deputy of Ireland), which provided that all former laws passed in England should be in force in Ireland, and that no Irish Parliament should be held without previously stating the reasons on account of which it was to be summoned, and the laws which it was intended to enact. The power of the English government in the Pale was thus strengthened, but nothing was done to improve the condition of the Irish, whom the oppressive severity of the English yoke embittered without subduing. At the beginning of the 16th century the greater part of the island still remained unconquered by the English. The Irish still lived according to their old constitution under their own chiefs. In 1541 Henry VIII received from the Irish Parliament the title of King of Ireland; but he did nothing to extend the English sway, or to improve the social circumstances of the people. The Reformation which took place in England during this reign took but a slight hold upon Ireland even in the English districts; but the monasteries were suppressed, and the tribute to the Papal see abolished. Elizabeth's reign was marked by a series of risings, which finally terminated in a general war against England, usually called the Rebellion. Hugh O'Neil, who had been raised by the queen to the dignity of Earl of Tyrone, was the leader in this war, which, though successfully begun, ended with the complete defeat of the insurgents, and the reduction of the whole island by the English (1603). More than 600,000 acres of land were taken from the Irish chiefs, and for the most part distributed among English colonists. The reign of James (1603–25) was somewhat favorable to Ireland; the arbitrary power of some of the chieftains was restrained, and the administration of justice improved, etc.; but the means which he took to effect some of these improvements were tyrannical. He demanded from every Irish chief the document upon which he rested his claim to his property, and if it were not to be found, or contained even any formal error, his lands were forfeited to the Crown. Of 800,000 acres of land which in this way came into the hands of the king in the north of the island, a large share was entirely withdrawn from the Irish, and divided among Scotch or English settlers. In addition to this, the Catholics, on account of the oath of supremacy by which all public officers were required to acknowledge the king as head of the church, remained excluded from all official appointments. The Roman Catholic hierarchy established in the 5th century was still in existence. Various circumstances led, in 1641, to an attempt to shake off the English yoke. Dr. Lingard says of this insurrection that it has been usual, for writers to paint the atrocities of the natives, and to omit those of their opponents, but that revolting barbarities are still recorded of both, and that if among the one there were monsters who thirsted for blood, there were among the other those who had long been accustomed to deem the life of a mere Irishman beneath their notice. After the death of Charles I, Cromwell was appointed (15 Aug. 1649) lieutenant of Ireland. With great cruelty, he reduced the whole country within nine months. All the possessions of the Catholics were confiscated, about 20,000 Irish were sold as slaves in America, and 40,000 entered into foreign service, to escape the severity of the conqueror. (See DROGHEDA). Charles II restored a portion of the lands, but fully two-thirds remained in possession of the English or of Irish who had become Protestants. Under James II some changes were made; under his viceroy, Earl of Tyrconnell, Catholics were given a fair representation in Parliament. In the English Revolution of 1688, the Catholics of Ireland sided with James, and the Protestants with William III. For a time the army favoring James was fairly successful; but the landing of William in Ireland changed matters. The battle, 1 July 1690, at the Boyne, won by William, proved a turning point, as it encouraged the English and in a great measure discouraged the Irish. Sarsfield's gallant defense of Limerick, the last place in Ireland that held out for James, saved that

city from capture by William's troops; but on 3 Oct. 1690, the city capitulated, a treaty being concluded with General Ginkell on behalf of the English, according to which the Irish were to be allowed the free exercise of their religion, as had been granted by Charles II. More than 12,000 Irish that had fought on the side of James went into voluntary exile. The Treaty of Limerick was not kept by the English, a fact which is commemorated by the name which the Irish still give to the place at which it was concluded, "The City of the Violated Treaty." By a decree of the English Parliament upward of 1,000,000 acres of land were now confiscated and divided among Protestants. In order to keep down every movement of the Catholic population, cruel penal laws were passed against those who adhered to that form of religion. By these laws the higher Roman Catholic ecclesiastical dignitaries were banished from the island; the priests were not allowed to leave their counties; no Roman Catholic could hold a public office, acquire landed property, enter into a marriage with a Protestant, etc. Such suppression and persecution naturally led to the formation of secret organizations whose object would be an overthrow of those in power, in order to secure freedom and justice. "Whiteboys," "Levellers," and a number of kindred organizations were formed, whose methods were not always fair; but who were brought into existence by force of circumstances. All this, however, did not ameliorate the general condition of the country, and it was not till the American War of Independence taught the English government the folly of attempting to govern a people by coercion, that the severity of the laws relating to Ireland was mitigated. In 1778 the penal laws against the Catholics, although not repealed, were made much more lenient. Catholics were henceforth permitted to acquire landed property, to erect schools, and to observe their own religion under fewer restrictions. In 1783 Poyning's Act was repealed.

The outbreak of the French Revolution had naturally a great effect on the minds of the Irish people. Out of a corps of volunteers which had been formed in 1779, but which had been dissolved a few years later, a society was formed calling itself the Society of United Irishmen, which included in it many Protestants, and which sought to make Ireland an independent nation. The Catholics at the same time took advantage of the embarrassment of the British government to demand equal rights with the Protestants, and the government gave in to this demand so far as to remove the hindrances which had been placed by the law in the way of Irish trade and industry, and to repeal nearly all that remained of the penal laws against the Catholics, who now received the right of acting as counsel before the court, and of entering into marriages with Protestants. When further demands were refused, the Society of United Irishmen allowed its revolutionary aims to become more apparent, and the government then determined to quell the movement by force. The Habeas Corpus Act, which had been introduced into the country in 1782, was repealed; the towns were strongly garrisoned, and the society dissolved and disarmed. But the conspirators, trusting to expected aid from France, were not discouraged. At the close of 1796 a considerable French fleet did actually appear off the Irish coast bearing 25,000 land troops, under the command of General Hoche; but owing to adverse winds, and the incompetence of the commanders, it was obliged to return without having accomplished anything. The only effect of this expedition was to induce the government to take still stronger measures in Ireland, the whole of which was placed under military law. The United Irishmen were thus prevented from taking any open steps for renewing the society, but they continued to pursue their ends in secret, and devised for themselves a very skilful military organization. At its head was a directory of five men, whose names were known only to those at the head of the provincial committees. In January 1798 the society already numbered more than 500,000 members, when a treacherous member gave information regarding the society to the government, and several of the leaders were seized. In consequence of this the conspirators, not knowing the extent of the revelations that had been made, resolved to anticipate any further preventive measures on the part of the government, and rushed into premature action. In May 1798, simultaneous risings took place at different parts of the island; but the government was fully prepared, and the main body of the insurgents, who made a brave fight, suffered a decisive defeat at Vinegar Hill on 21 June. Flying columns traversed the island, and checked by the most violent measures any further outbreaks. In August a French squadron appeared in Killala Bay with 1,500 men on board, under General Humbert; won a victory over the garrison at Castlebar, but were compelled to surrender at Ballinamuck. Another French expedition which approached the Irish coast in September was overtaken and attacked by Admiral Warren, and nearly all the ships composing it were captured. Several subsequent attempts of the French were similarly frustrated.

The events of this insurrection brought the British government to form the resolution of uniting the Irish and English Parliaments, since in the state of feeling which that movement too plainly manifested as prevailing among the people, it was seen that the independence of legislation enjoyed by the country fostered the desire of political independence and it was feared that new revolutionary efforts might thence derive a legal sanction. The first proposal to this effect which was made in the Irish Parliament was rejected with indignation. The government then resorted to bribery to secure its purpose, and $8,000,000 was spent in buying up the rotten boroughs which had the majority of seats in the Irish House of Commons. The Irish landlords were from the first favorable to the project. By these means an act providing for the legislative union of the two countries passed the Irish Parliament on 26 May 1800, and the British Parliament on 2 July in the same year, in virtue of which the union was effected on 1 Jan. 1801. But although this measure bound the destinies of Ireland still more closely to those of England, yet it was far from putting an end to the religious and political troubles which had so long divided the two countries. In order to gain the masses the enlightened Pitt had promised a complete political emancipation of the Catholics; but the bigoted George III could not be induced to make this

concession. Enraged at this great breach of faith the Catholics in 1802 formed a Catholic Association, having for its object the accomplishment of this end; but it was not till the period of O'Connell's agitation, favored by a change of public opinion in England, that the government was induced to bring in an Emancipation Bill, which after passing both houses of Parliament, received the assent of George IV on 13 April 1829. A new oath, which could be taken by Catholics as well as Protestants, was substituted for the one previously required from members of Parliament, and the Catholics were thus enabled to take a seat in the House. They were also allowed to fill all public offices except that of lord-chancellor and lord-lieutenant of Ireland, disabilities under which they still suffer.

This victory was greeted by the Irish Catholics with great joy; but they wanted more than emancipation which meant permission to hold certain offices; they wanted an independent Parliament. The efforts of the national party were now directed to the repeal of the Union, for which purpose O'Connell founded the Repeal Association, which caused the Grey ministry in 1833 to bring before Parliament the Irish Coercion Bill. When this bill became law the Lord-Lieutenant of Ireland was empowered to forbid all assemblies of the people, and to proclaim military law throughout the island; and in order to give force to the act an army of 36,000 men, besides 6,000 armed police, was sent over. The Coercion Act was indeed soon repealed, and from 1835, under the viceroyalty of Lord Mulgrave, a better feeling seemed to be growing up between the people and the government. But when the Tories came again into power in August 1841, O'Connell began anew the repeal agitation, and with such boldness that in 1843 the authorities caused him to be apprehended on a charge of conspiracy and sedition, on which he was convicted and condemned to pay a fine and suffer imprisonment for a year. These proceedings were, however, declared illegal by the House of Lords, and O'Connell was released. Soon after the terrible famine which visited Ireland in the autumn of 1845, and still more severely in the summer of 1846, cast all other interests into the background. The spirit of the people seemed broken, and many of them sadly left their native land and by hundreds of thousands emigrated to America. In the midst of this crisis O'Connell died, and the place of the party which he led was taken by one still more advanced which received the name of Young Ireland. In these circumstances of political excitement the French Revolution, which took place in February 1848, had a great effect upon Ireland. The leaders of the Young Ireland party, Smith O'Brien, Mitchel, Davis, Meagher and others, entered into relations with the provisional government at Paris, and the people generally began openly to provide themselves with arms, and to exercise themselves in the use of them. But the measures of the government frustrated the designs of the conspirators. The Habeas Corpus Act was suspended, the insurrectionary newspapers suppressed, and Smith O'Brien, who had been hailed by the people as King of Munster, and a number of his associates were arrested and condemned to death. This punishment was afterward commuted to transportation. In a short time peace was restored; but the material distress remained undiminished. Famine and disease decimated the population. The agricultural holdings were deserted, whole districts remained uncultivated, and a constant and overflowing stream of emigration directed itself toward the United States.

After a time agriculture revived, and the manufacturing industries of the island began to compete with those of England. In 1849 were chartered the Queen's Colleges, offering the same advantages to Catholics as to Protestants: but these institutions were taken comparatively little advantage of by the former. The history of those institutions made the Catholics fear they were meant as a menace to their faith. In 1852 telegraphic communication was opened with Great Britain. In 1853 an industrial exhibition was held at Dublin, resembling that held two years before in London; another exhibition was held in 1865. The latter year witnessed the discovery of a new conspiracy designed to effect a separation between England and Ireland. This had its origin in America at the time of the Civil War in the United States, when the friendly Irish in that country saw an opportunity in England's friendly attitude toward the seceding States. This conspiracy, originating among the members of a secret society calling themselves Fenians (q.v.), soon spread to Ireland, but before the Fenians could take any overt action in that island their design was stifled by government action from the moment a riot broke out at the Rotunda in Dublin on 22 Feb. 1864. The troubles continued, and British statesmen were driven to make some amends for the wrongs of their predecessors in Ireland. With this object in view an act was passed in 1869 to disestablish the Irish Protestant Episcopal Church, and another in 1870 to improve the tenure of land. An agitation for Home Rule was carried on resulting in the final enactment into law of a measure of self-government in 1914. In 1880 Ireland became the scene of an agitation carried on mainly by a body calling themselves the Land League. Various severe laws were passed to "coerce," but further concessions were made, and to redress Irish grievances a land act was also passed in August 1881, under which substantial reductions on rents were made, exorbitant or rack rents, as they were called, being the cause of the great agrarian agitation. The Land League was suppressed after wielding a reign of terror and a new body called the National League was soon organized in its place (1882). Over 4,000 agrarian outrages were committed by the Land Leaguers during 1881: many murders were perpetrated and close on to 2,500 persons were arrested, including several Irish members of Parliament. On 6 May 1882 Lord Frederick Cavendish, the new chief secretary for Ireland, and Mr. T. H. Burke, permanent under-secretary, were both stabbed to death in Phœnix Park, Dublin, by four men of the Irish "Invincibles." A reward of £10,000 was offered by the government for the discovery of the murderers. Through the agency of informers the criminals were brought to justice and executed. A long, melancholy series of riots, murders and consequent executions prevailed for a period of 30 years, from 1860 to 1890. Judges, jurymen, government officials and peasants, including women, were the victims of attacks by "moon-

lighters," who shot peaceful farmers in their cottages through the windows at night and introduced the system (1880) of ostracism known as "boycotting." In 1885, 86 Nationalist members, headed by C. S. Parnell, were returned to Parliament, and their pressure on the government led to the introduction of a bill by Gladstone in 1886 by which Ireland was to receive a Parliament of her own and the Irish members were to be withdrawn from the Imperial Parliament The measure was defeated by an overwhelming majority in June and led to the great "Home Rule split." A "sale and purchase of land" bill was also rejected, and the Gladstone ministry resigned 20 July 1886. Widespread refusals to pay exorbitant rents and dispossess notices served without compensation for improvements to lands or farmsteads led to forcible evictions and riotous scenes. The "Prevention of Crimes" act, which expired in September 1885, was replaced by a new criminal law procedure bill passed in 1887. Under the provisions of this act 18 countries were proclaimed within the scope of its operation; 12 counties partly, the city of Dublin, and 9 other cities. A new land bill, favorable to the tenant, was also passed in 1887. During the autumn many evictions were carried out in the face of violent resistance. On 7 March 1887 began the publication, in *The Times,* of the famous "Parnellism and Crime" articles. On 6 July 1888 Parnell stated in the House of Commons that the letters attributed to him in those articles were forgeries, as, indeed, they were proved to be by the Parnell Commission. Pigott, the forger of the letters, committed suicide in a hotel in Madrid, and the episode cost the *Times* about $1,250,000 in damages, legal fees, etc. Early in 1890 the stringency of the Crimes Act was relaxed owing to the decline of outrages and riots. During his tenure of the chief secretaryship Mr. A. J. Balfour introduced a number of useful measures for the improvement of the country, such as the Land Purchase Act, drainage of rivers and construction of light railways. A very important Local Government (Ireland) Act was passed in 1898, which established county councils, urban district councils, rural district councils in Ireland, and transferred to the first named the administrative functions formerly discharged by the grand juries and presentment sessions. The first elections under the act took place early in 1899, the results of which showed that the voters of Ireland realized they were gaining ground. They never missed an opportunity, however, to proclaim their discontent with the existing land laws, and their desire for a compulsory Purchase Land Act. The Irish members of the Imperial Parliament kept the cause of the farmers before Parliament; and in 1903 a valuable concession was gained by the introduction of Wyndham's "Land Act," whereby the tenants, sub-tenants, or occupiers, may purchase the land and hold it as their own. In the same year King Edward and Queen Alexandra visited Ireland. Three years earlier (1900) Queen Victoria had been fairly well received in Ireland after an interval of 39 years since her previous visit, but the Boer War, in which Irish sympathies were with the Boers, did much to dampen the national enthusiasm. In March 1903, Saint Patrick's Day was constituted a national or "bank holiday." Sporadic disorders, riots and agrarian outrages continued; conflicts between police and tenants; imprisonments of Irish members of Parliament for sedition and inciting to violence. In April 1904 King Edward laid the foundation stone of the new buildings of the royal college of science in Dublin. During 1905 the board of national education, which controls and administers the whole system of primary education in Ireland, was confronted with a formidable agitation organized by the Gaelic League to apply the resources of the state to the development of the Irish language and the national propaganda of the league. With the accession of the Campbell-Bannerman administration in January 1906 Mr. James (now viscount) Bryce became chief secretary for Ireland. He began the work — completed by Mr. Birrell in 1908 — of creating the National University of Ireland in which it is possible for Roman Catholics to secure higher education without being subjected to any religious test. During 1907–09 there was a recrudescence of riots and agrarian outrages, the latter principally in the form of "cattle-driving." Shortly after the coronation in 1911 King George and Queen Mary paid a visit to Ireland.

The introduction of the third Home Rule bill by Mr. Asquith in 1912 opened another stormy period in Irish politics. Uncompromising opposition arose on the part of the "Unionists" of Ulster, headed by Sir Edward Carson. A "volunteer army" was raised in Ulster to resist by force if necessary the application of Home Rule to that province. The Nationalists, in their turn, also began to enroll and drill volunteers, with the strange result that Ireland became the camping ground of two illegal hostile armies. The government prepared to take military precautions. On 20 March 1914 it was announced that a grave crisis had arisen in connection with the troops in Ireland; that in consequence of orders to move troops into Ulster and the sending of a warship to Belfast, many officers of the Curragh garrison had tendered their resignations. Four days later it became known that Colonel Seely, Secretary of State for War, Sir John (now viscount) French, Chief of the Imperial General Staff, and Quartermaster-General Sir J. S. Ewart had initialled a memorandum, given to Brigadier-General Gough, who commanded the cavalry on the Curragh, pointing out that it was the duty of all soldiers to obey lawful commands, but concluding: "But they (the Cabinet) have no intention whatever of taking advantage of this right to crush political opposition to the policy or principles of the Home Rule Bill." The publication of this last clause produced a political sensation. Colonel Seely apologized in Parliament on the 25th for having amplified the memorandum to General Gough after the text had been approved by the Cabinet, and tendered his resignation, which was not then accepted. It developed that General Gough and 57 officers preferred dismissal from the army to taking up arms against the Unionists of Ulster. These officers were suspended, but afterwards reinstated. General French resigned, only to be recalled four months later to command the British forces against Germany. On 24 April 1914 a new crisis arose in consequence of a gun-running exploit of the Ulster volunteers, when 40,000 rifles and 1,000,000 rounds of am-

munition from Germany were landed. In the midst of this turmoil when civil war appeared imminent, the European crisis which culminated in the great war placed the Irish problems in the background. Sir Edward Carson was soon afterward rewarded with a seat in the Cabinet and General French was made Commander-in-chief of the Expeditionary forces.

The ill-starred Irish rebellion of 1916 was attributed to the lax administration of the chief secretary (Mr. Birrell) and the Lord Lieutenant, Lord Wimborne. See BIRRELL, A.; FENIANS; GREAT BRITAIN: IRELAND; HOME RULE; IRISH REBELLION; REDMOND, JOHN; SINN FEIN.

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IRELAND, Church of. See IRELAND.

IRELAND, Language of. See CELTIC LANGUAGES; CELTIC LITERATURE; GAELIC LITERATURE.

IRELAND ISLAND. See BERMUDA ISLANDS.

IRENÆUS, ī-rē-nē'ŭs, **Saint,** one of the Greek Church Fathers: b. Asia Minor: d. Lyons, France, about 202. He was a learned and zealous man, a pupil of Polycarp and Papias. He actively opposed the Gnostics, and especially the Valentinians. His works are lost, except his 'Libri V adversus Hæreses,' of which there are fragments in the original Greek, and a Latin version, made, it is supposed, toward the end of the 4th century. According to tradition he suffered martyrdom at Lyons, of which he was bishop, in the persecution under Septimius Severus.

IRENE, ī-rē'nē, empress of Constantinople: b. Athens, about 752 A.D.; d. Lesbos, 15 Aug. 803, In 769 she married Leo IV, after whose death, caused, as is generally believed, by poison administered by her, she raised herself (780) and her son Constantine VI, then but nine years old, to the Imperial throne. When Constantine came of age he refused to permit her to participate in the government, and seven years later was arrested at the order of his mother, blinded and at last murdered. Irene was the first woman who reigned over the Eastern Empire. Her triumphal entrance into Constantinople, her liberality, the freedom bestowed on all prisoners, and other artifices employed by her, were not sufficient to secure her from the consequences of her criminal accession. She had ordered many nobles into banishment, when Nicephorus, her treasurer, who had secretly been made emperor, exiled her in 802 to the Isle of Lesbos. Her zeal for image-worship has caused her to be regarded as a saint by the Greek Church.

IRETON, ī'tŏn, **Henry,** English general and statesman: b. Attenton, Nottinghamshire, 1611; d. Limerick, Ireland, 26 Nov. 1651. He was graduated at Trinity College, Oxford, and brought up to the law; but when the civil contests commenced joined the parliamentary army and by the interest of Cromwell, whose daughter Bridget he married in 1646, became commissary-general. At the battle of Naseby he commanded the left wing, which was defeated by the furious onset of Prince Rupert, and was himself wounded and made prisoner. He soon recovered his liberty, and took a prominent part in all the transactions which threw the Parliament into the power of the army. He had also a principal hand in framing the ordinance for the king's trial, and was one of the judges. Ireton accompanied Cromwell to Ireland in 1649, and was left by him in that island as lord-deputy. He reduced the natives to obedience with great vigor, but not without cruelty. He was buried in Westminster Abbey, and after the Restoration his body was taken up, suspended from the gallows with that of Cromwell, and buried in the same pit.

IRGENS, Johannes, Norwegian statesman and diplomat: b. Aas, 1869. He received his education at the University of Christiania and entered the public service soon after his graduation. In 1892–95 he was in the consular service at Bordeaux and Antwerp; from 1895 to 1905 he was engaged in the practice of law at Christiania; in 1906 was appointed Secretary of Legation at London and in 1908–10 was Norwegian Minister to England. He held the port folio of Minister of Foreign Affairs from 1910 to 1913.

IRIARTE, ē'rē-är'tā, **Juan de,** Spanish poet: b. Orotava (Tenerife, Canary Islands), 15 Dec. 1702; d. Madrid, 23 Aug. 1771. Educated in the College of Luis el Grande in Paris, he went to Madrid in 1724, where he became clerk in the Royal Library (1729) and ultimately librarian (1732). There he spent all his spare time in literary labors and research work. Owing to his linguistic ability he was appointed official translator to the Secretary of State (1742); and the following year he was elected a member of the Academia Española. So excellent was his command of Latin that he wrote as perfect poems in it as in Spanish. After his death a fine edition of his works was published by his wealthy admirers in Madrid (1774). He covered a wide range of subjects from Latin grammar and Greek paleography to hundreds of epigrams and sonnets. His work in bibliography was both excellent and extensive. On account of his philological and grammatical studies he is considered, in Spain, as one of the great authorities on the Spanish language and is so classed by the Academia Española. Consult Vol. LXVII of the 'Biblioteca de Autores Españoles' (Rivadeneiro).

IRIARTE, Tomas de, Spanish poet: b. Orotava (Tenerife, Canary Islands), 18 Sept. 1750; d. Madrid, 17 Sept. 1791. He was a nephew of Juan de Iriarte (q.v.) and was educated under the direction of his elder brother, Fray Juan Tomas de Iriarte, and later in Madrid with his uncle under whom he studied Latin literature, mathematics, natural sciences, Greek, history, English, French and Italian. At the age of 17 he wrote a drama (in verse), 'Hacer que hacemos,' and at this early age he began translating dramas from French for the theatres of the city. So successful was he at this work that some of his original dramas were produced. On the death of his uncle, Juan de Iriarte, he succeeded him as official translator in the office of the Secretary of State (1771); and five years later he was appointed archivist to the Supreme War Council. In 1787 his works were published in six volumes in Madrid. A goodly part of his energies was taken up in quarrels with the critics of the day and with some of his literary contemporaries, the most notable of which was Juan Pablo Forner, who in turn, lashed him without pity, and sometimes without reason. Through the intrigues of his enemies Iriarte was summoned before the Inquisition in 1786, on the charge of propagating French heretical doctrines. But he was able to satisfy the ecclesiastical authorities as to his orthodoxy. Iriarte did much translation and wrote poems and dramas, and attempted other forms of literary work, but his fame to-day rests on his fables in verse, which are counted by far the best of their kind in Spanish. Their excellence is due not so much to the poetic talent of the author, which was not very great, as to the interesting form in which the fables are thrown, the ingenuity of many of them, their simplicity, vivacity, grace and appearance of naturalness supported by fertility of invention. These 'Fables' became immensely popular, and were translated in most of the languages of Europe. Perhaps the interest in them in Spain was increased by the belief that, under the guise of fable, Iriarte was holding up to ridicule many of his literary detractors. Consult Cotarelo y Mori, 'Iriarte y su época' (Madrid 1897). See FABULAS OF TOMÁS DE IRIARTE.

IRIARTEA, a genus of palms, all South American, marked by smooth, tall stems and pinnate leaves with somewhat triangular leaflets. The best-known species is the pashuiba palm (*I. exorrhiza*), which has aerial roots. The wood is very hard, is in demand for floors, harpoons, etc.

IRIDEÆ, or IRIDACEÆ, a natural order of endogenous plants, mostly herbaceous, though a few are somewhat shrubby. They have generally either root-stocks or corms. The leaves generally are sword-shaped, in two rows and equitant. The perianth is six-partite and often very beautiful, in some regular, in others irregular. There are three stamens with the anthers bearing outward. The fruit is a three-celled, three-valved capsule. Almost 600 species are known, the greater number natives of warm countries. They are abundant in South Africa. Iris, gladiolus and crocus are familiar examples of the order. Saffron is the principal economical product. Acridity is a prevailing characteristic, and some species are medicinal; but the corms and root-stocks of some are edible.

IRIDESCENT GLASS. See GLASS.

IRIDION (Polish *Irydyon*). The dismemberment of Poland, still more, the disastrous Polish revolution of 1830, had bred the

sentiment of national hatred against the oppressors, but Krasiński, in all his poetry, cautioned his people against hate as an expression of patriotism and preached inner perfection as a means of obtaining the highest good for his country. 'Iridion,' which appeared in Paris in 1836, is a poem-drama of exquisite beauty, based on Krasiński's reading of Montesquieu, Gibbon and Niebuhr. In this poem he wished to give a picture of the fall of pagan Rome and the triumph of Christianity, and tried to show that it was not Greek hatred, but Christian humility, that renovated the Roman world. In the days of the domination and corruption of the Cæsars, Iridion, who is represented as of Greek ancestry, sought vengeance against the Rome that had betrayed Athens and throttled Corinth. His mother was a priestess of Odin, and after her death he gave his sister to Heliogabalus, so that she might unsettle the emperor's mind. Iridion, as prefect of the Pretorians, urges Heliogabalus to conspire against Rome. The African Massinissa, versed in magic, persuades him to arm the Christians. Iridion, in the Catacombs, falls in love with a Christian maiden, who thinks that he will bring about the millenium. But just as he appears to be victorious, the bishop of Rome denounces his militancy. He returns to the northern gods of his mother. Heliogabalus and his sister perish. Massinissa tauntingly tells Iridion that Christ will some day rule over Rome, and puts him into a lethargic sleep. He does not awaken until 1835 in the north, but he now loves Christ's cross and has abandoned all ideas of revenge. 'Iridion' was translated from the German and French by Martha Walker Cook, in 'The Undivine Comedy and other Poems, by the anonymous poet of Poland, Count Sigismund Krasińsky' (Philadelphia 1875).

LEO WIENER.

IRIDIUM, a metallic element resembling platinum in its general properties, and occurring in nature in the metallic form, alloyed, usually, with platinum and osmium. The commercial supply comes chiefly from the Ural district, from Brazil, and from Borneo. Small amounts have also been obtained from California. The existence of iridium was first recognized, in 1802, by Tennant, who observed that an insoluble residue remained behind after dissolving platinum ore in aqua regia. In 1804 he showed that this residue contains two new metals, to which he gave the respective names «iridium» and «osmium.» The separation of iridium from the other metals of the platinum group is a matter of some difficulty; and for details of the processes employed the more extended treaties on metallurgy and the chemistry of the metals must be consulted. Iridium is frequently obtained in the form of a spongy gray mass, or a gray powder; but by heating either of these to whiteness, and subjecting them to compression, the metal may be brought into the form of a compact, lustrous mass resembling steel. In this form it is harder than iron, and somewhat malleable when hot, though brittle when cold. At ordinary temperatures it has a specific gravity of about 22.4, being among the heaviest substances known. Its specific heat is about 0.0323 at ordinary temperatures, and its coefficient of linear expansion (Fahrenheit) is about 0.0000039. Its melting point is very high, the estimates given by various authorities ranging from 3,600° F. to 4.500° F. Compact iridium, after being strongly heated, is insoluble in all acids, and is not affected by air or moisture. The metal has the symbol Ir. and an atomic weight of 193.1 if O = 16. It forms numerous salts, but these are of no practical importance. The name «iridium» (from Greek, «rainbow,») refers to the varied colors exhibited by the salts of this element, as they pass from one state of oxidation to another. Metallic iridium, either alone or alloyed with other metals of the platinum group, is used in the arts to a limited extent, where a hard, non-corrosible metal is needed. The standard meter at Paris is a 10 per cent alloy of iridium with platinum. In particular, it is used for the tips of gold and stylographic pens, for the construction of standards of length, and for standard electrical resistance coils. Chemically it is related to osmium and platinum and more distantly with rhodium, ruthenium and palladium.

IRIDOSMINE, ĭr-ĭ-dŏs'mĭn, or **OSMIRIDIUM,** a natural alloy of iridium and osmium in varying proportions, is a hard slightly malleable mineral, crystallizing in hexagonal prisms. It occurs as irregularly flattened grains, and contains some platinum, rhodium and other metals of the platinum group. It is found associated with platinum in the Ural Mountains, in South America, and elsewhere. It is also found in the black sands on the ocean beaches of northern California, and a small amount is recovered yearly by placer miners in the Sierra Nevada. Iridosmine is used to a small extent for pointing gold pens.

IRIGA, ē-rē'gä, Philippines, pueblo of the province of Ambos Camarines (Sur), Luzón, on the Buhi River, 23 miles southeast of Nueva Cáceres. It is on the main road, is a military and telegraph station, and one of the most important towns in the province. Pop. 19,297.

IRIS, ī'rĭs, in Greek mythology, daughter of Thaumas and Electra, sister of the Harpies, the fleet golden-winged messenger and servant of the Olympian gods, especially of Zeus and Hera. Iris was originally the personification of the rainbow, though she does not appear in the Homeric poems as the goddess of the rainbow. She is sometimes represented as a beautiful virgin with wings and a variegated dress, with a rainbow above her, or a cloud on her head exhibiting all the colors of the rainbow. Iris is the name of a planetoid.

IRIS. See EYE.

IRIS FAMILY, a family of monocotyledonous herbs, mostly perennials with tubers, corms or rhizomes, and usually with an acrid flavor. About 800 species belonging to more than 50 genera have been described from temperate and tropical climates, mostly from South Africa and tropical America. They are characterized by two rows of leaves, the outer of which fit over and protect the inner (equitant); regular or irregular perfect flowers which are frequently handsome; perianth six-parted, the other floral organs in threes; and many-seeded, three-celled fruits (capsules). Some species have been used as food in countries where they are native; others furnish rootstocks which are used for making perfumes, especially orris; some few have been employed to a limited ex-

tent in medicine but the species most widely popular are cultivated for ornamental purposes. Of these last the most important genera are *Iris* (fleur-de-lis), *Gladiolus, Freesia, Crocus, Tigridia, Tritonia, Sisyrinchium, Ixia* and *Belamcanda,* elsewhere described.

The plants of the genus *Iris* constitute one of the chief ornaments of the northern regions of the globe, and usually grow in wet places, bearing flowers of various colors, but the prevailing tint is blue. The common wild iris or flag (*I. pseudacorus*), common in Europe and also found in the eastern United States, has yellow flowers of large size and long sword-like leaves. The gladdon or stinking iris (*I. fœtidissima*) is a British species, with bluish flowers. Among favorite garden species are the English iris (*I. xiphioides*), the Persian iris (*I. persica*), the common iris (*I. germanica*), and the Chalcedonian iris (*I. susiana*). Probably the favorite species in cultivation is the Japanese iris, *I. lævigata.* Orris root consists of the rootstocks of the white-flowered *I. florentina* and some other species. Among the species found in the United States are the larger blue flag (*I. versicolor*), common from the Atlantic coast to the Mississippi, the slender blue flag (*I. prismatica*), and several dwarf species.

IRISH. See CELTIC LANGUAGES; IRISH LITERATURE.

IRISH ACADEMY, Royal, a literary and archæological association founded in Dublin, Ireland, in 1786. Its object is to promote the study of literature, antiquities and science. The library founded and owned by the association contains a large number of Irish manuscripts and documents of public interest. It has a fine collection of antiquities which have been loaned to the National Museum, Dublin. In 1870 the academy began the publication of an ancient Irish MSS.

IRISH ARCHÆOLOGICAL REMAINS. Ireland has been called the wonder of Europe for the wealth and beauty of its relics of the past. Those relics range in scale from cyclopean structures like Dun Aenghus on the isle of Aran and Staigue Fort in the ancient kingdom of Kerry, that awe the mind by their massive strength and the evidences of their vast antiquity, to dazzling collections of gold ornaments the chief characteristic of which is their delicate minuteness of finish. Between these there is a multitude of other memorials, some of them unique and remarkable. There are for example the solemn burial places of great chieftains like the City of Tombs in the valley of the Boyne, the great stone circles like those of Carrowmore, and the remains of royal seats in which Ireland is very rich. From Ireland's distant pagan period cairns, dumas, tumuli, moats, menhirs, dolmans, cromlechs, earthworks, beehive cells, kistvæns, pillar stones and Ogham stones have been preserved to us in great numbers. From both the pagan and the early Christian period there have been counted as still existing over 2,000 chambered and unchambered mounds piled up by human hands, "the circular raths and princely palaces of earth" of the Irish epic tales. The early Christian period introduces us to an Ireland honeycombed with monasteries and schools, dominated by great monastic universities such as those of Armagh, Clonard and Clonmacnois. In architecture, in sculpture, in metal work and in the production and ornamentation of manuscripts, Irishmen were then the chief exponents and teachers, and the material evidences of their superior skill, despite the ruin of centuries, may be still gazed upon and handled to-day. It was during this period that the decorated high crosses and round towers, that are among the chief glories of Ireland, began to rise over the land. Earlier than the round towers are the tiny stone churches, cyclopean in construction and primitive in character, like those of Maghera and Banagher, Temple Cronan, Devenish, Saint MacDara's Isle, Inishmurray and numerous others. There is hardly an Irish isle indeed that does not carry some memorial or ruin belonging to that prolonged mediæval period when Ireland was the school of the West and the quiet habitation of sanctity and learning. For that period indeed we have to look for Irish memorials not merely in Ireland but in almost every country in Europe, for it was the period of Irish missionary enterprise when Irishmen carried their art and learning over all the West. Heinrich Zimmer has counted over 200 Irish manuscripts in libraries on the continent dating from before the 11th century. There are probably many more. But these manuscripts represent only part of the valuables formerly carried out of Ireland. When the reign of peace, covering more than a thousand years of freedom from foreign invasion, finally was broken in the 9th century by the Danish wars, much that was precious began to be carried for safety across the seas, so that in some directions Irish art may be represented better abroad than at home.

Gold Articles.— Foremost in interest to many among the heirlooms bequeathed by Irish antiquity are the truly marvelous collections of solid gold ornaments to be seen in the Royal Irish Academy and elsewhere. Some 500 golden ornaments of old times have been there gathered together in the last 80 years; their weight is 570 ounces against a weight of 20 ounces in the British Museum from all England, Scotland and Wales. If these Irish remains represented the total wealth of gold of the Bronze Age in the island, the amount, as Sir Hercules Reid points out, would probably exceed that of any ancient period in any country, except perhaps the republic of Colombia in equatorial America. But the known remains can only be a small portion of the original wealth of Ireland. Vast quantities must have been discovered from mediæval times onward, nearly all of which would be melted down and carried out of the country. Sir William Wilde, as he testifies in his 'Catalogue,' knew individual jewelers through whose hands passed large quantities of Irish gold, the amount in one case being valued at $50,000. Attention has often been drawn to the fact that up to the 15th century in the literature of no country are there as many references to gold as in Irish literature. Thus we read in the 'Annals of the Four Masters' at the year 1169 A.D. that "Donough Ua Cearbhaeil, Lord of Airgialla, died after bestowing 300 ounces of gold, for the love of God, upon clerics and churches." Ireland's wealth in gold from the Bronze Age onwards, if stated in sober figures, says Sir Hercules Reid, would appear so enormous as hardly to be credited. In the collec-

tion in the Dublin Museum may be seen circlets, fibulæ, diadems, torques, bracelets, rings, garters, crescents, brooches, braid balls, tiaras, ear-rings, etc., all of pure gold and the most exquisite workmanship.

Side by side with the gold ornaments in the National Museum in Dublin are relics of the Stone, Bronze and Iron Ages in Ireland — stone and bronze discs and axes, decorated spear heads, daggers, swords, etc., showing a development covering several thousand years.

Sepulchral Monuments.— Belonging to the same distant age that produced this wealth in gold are the great sepulchral monuments that rise above so many Irish landscapes. The vast incised tumuli of New Grange, Knowth and Dowth are among the most remarkable in the world and rank after the pyramids of Egypt in the stupendous labor that must have been expended in their erection. They are the leading elevations in the assemblage of artificial moats, cairns, forts, chambers, catacombs, caves, crypts, monolith circles and pillar stones, figuring in Irish literature as the royal cemetery of Brugh-na-Boinne, the burial place of the first authentic kings of Ireland of the Tuatha de Danaan. Here, near Slane, on the north bank of the River Boyne, nearly a score of the habitations of Ireland's royal dead are spread over an area three miles long by over a mile broad. At Dowth the general plan is of three central chambers, from the largest of which a long corridor leads to the world outside. Round the tumuli are the remains of circles of giant sentinel stones, after the plan of the Celtic memorials at Stonehenge. The names of the royal personages interred at Brugh-na-Boinne are given in an Irish tract, the Senchas-na-relec, or History of the Cemeteries, contained in the celebrated vellum compilation, "Leabhar na h'Uidhre," or "Book of the Dun Cow," a 12th century work copied from older Irish manuscripts. The cemetery of Croghan is called in the old documents Relig-na-Rig, or Burial Place of Kings, and has numerous sepulchral monuments. Tailtenn also figures in Irish literature as a royal seat and cemetery, and is still more celebrated as the scene of the Irish Olympics, the annual fairs and funeral games on the lines of those in Greece. Cemetery, palaces, raths, stadia, sporting greens, beds of artificial ponds, etc., have been nearly obliterated, and one large rath is the chief remnant of Tailtenn's former grandeur. At Ballylochloe in West Meath there is still a vast and wonderful moat, the chief relic of a pagan cemetery, and another near Clonard, visible for miles around. Of many of the others the material evidences remain, but the history is lost. There is, for example, a remarkable city of the dead on the ridge of the Loughcrew hills near Oldcastle in Meath. It comprises a truly marvelous collection of giant tumuli, cairns, cromlechs, funeral chambers, stones mystically carved and stone saucer-shaped sarcophagi of the same general character as those of Brugh-na-Boinne. Yet not a word about this sepulchral assemblage is to be found in the old Irish books.

Royal Seats and Strongholds.— No less remarkable than the remains of these habitations of the dead are the ruins of the habitations of the living, and among these the great strongholds and residences of the Irish monarchs are of primary interest. Almost all the ancient residences of the high kings as well as of the minor kings, are known at the present day, and as there were many kings of several grades, and as each was required by the old Irish laws to maintain at least three separate establishments, the royal houses were numerous. Teimar or Tara was pre-eminently for centuries the capital and chief royal seat in Ireland, and was at its zenith in the reign of the monarch Cormac, the son of Art, who reigned from 254 A.D. to 277, and is accounted among the greatest of Ireland's kings. Cormac is credited with founding a university, having three separate colleges, and one reputed product of his pen, the 'Teagasg Flatha,' or 'Instructions to a Prince,' written for the benefit of his son, Cairbre, who succeeded him, has been preserved to us. On the northern slope of the hill are the remains of the great Banqueting Hall, where the Feis or Parliament of Tara held its sessions, the only structure in Tara that is not round or oval. The foundations and ramparts of other buildings celebrated in Irish history are still to be seen — the Duma na Giall or Mound of the Hostages, the Rath Laegaere, the Rath Grainne, the Rath Caelchon, the Rath of the Kings, the House of Cormac, the Foüad or Forum, the Rath na Seanaid or Rath of Synods, as well as wells and crosses, and the junction of the ancient national highways that led through the five provinces. Ailech of the Kings, a residence of the kings of Ulster, was another Irish royal seat of the first rank. Better preserved than Tara, it remains one of the most important ruins of Europe, with a great circular stone cashel of dry masonry, with walls 13 feet thick at the base and sloping gradually inwards. It is interesting to observe that Aileach is one of the few spots in Ireland marked in its proper place by the geographer, Ptolemy of Alexandria, who flourished in the 2d century. Aileach is distinguished by Ptolemy as a royal residence. Another Irish royal seat is represented now by the ruined palace of Emain, now called Navan (N-Emain) Fort. It was for 600 years the residence of the kings of Ulster and attained its greatest glory in the 1st century of the Christian era during the reign of Concobair (Connor), the son of Nessa. It was the centre round which clustered the romantic tales of the Red Branch Knights, chief among whom was the youthful Cuchullain, the Achilles of the great Tain Bo. The imposing remains, consisting of a great fortified mound surrounded by an immense circular rampart and fosse, the whole structure covering about 12 acres, lie two miles west of Armagh. They are typical of the condition of the other royal seats throughout the five principalities of Ireland, such as Cruachan, the chief palace of the kings of Connacht; Ailenn, now Knockaulin, one of the highest forts in Ireland, Dinnrigh, Nass, Liamhain (Leevan), Belach-Chonglais or Baltinglass, the more important residences of the kings of Leinster, in all of which the great circular raths remain. There is another class of ancient palace, more patently strongholds than royal residences, and these are almost the earliest of all — great stone cashels or circular walls of immense thickness, enclosing large

spaces, unmortared, in which there are great quantities of masonry. Around their summits a chariot might be driven, within the area enclosed horse races might be run. The most singular and imposing of these is Dun Aenghus on Inishmore, the chief of the Aran Islands, one of the remarkable ruins of the world. Inishmore, the most westward of the Aran Islands, is fretworked from one end to the other with ruins and memorials of pagan and early Christian times. There is hardly a place in western Europe of similar area enclosing a like multitude of archæological records; its nearest parallel is Carnac in Brittany.

Early Christian Edifices.— Of the earliest Christian stone edifices in Ireland, Gallerus remains; and the Skelligs, where the very cliffs are worked into the scheme of architecture, preserve both church and cell almost perfect. From the 7th, 8th and 9th centuries there are numerous examples of oratories, some with stone roofs. Such churches can still be seen at Aran and Inismurray, on the islands of Lough Derg, Lough Ri, and in many other places. When larger churches were built the earlier structure was sometimes used as a chancel, as at Inis-na-ghoill in Lough Corrib, at Glendalough, at Inis-cleraun in Lough Ri, at Clonmacnois, at Iniscaltra and elsewhere. From the early Middle Ages onward we find the most elaborate carvings on door and arch and window, equal in skill to that found in book and metalwork. This same style of Irish architecture is likewise found in Scotland and England where it was introduced by the Irish missionaries who evangelized both countries as in the early churches at Monkwearmouth, Hexham, Bradford-on-Avon, and elsewhere. Venerable also are the remains of the great monastic universities and academies so celebrated in history. Of some of the oldest of them, such as Armagh, Bangor and Clonfert, hardly a vestige of the ancient edifices remains. Of others such as Clonmacnois, Kells, Monasterboice, Saint Enda of Aran, and Glendalough of the Seven Churches, the ruins are important, including round towers, decorated high crosses, oratories, beehive cells, stone churches, Ogham stones and a great number of other slabs and headstones bearing inscriptions written in Irish minuscules both in the Irish and Latin tongues. Ogham stones and pillar stones bearing inscriptions in Irish and in Latin carved in mediæval Irish minuscules and semi-uncials are likewise found in Scotland, Wales and Cornwall, and in England as far east as Hampshire, wherever indeed the Irish Gael established a military colony. To the Irish series must be added the important ruins on Iona, which during the 1,000 years of its existence remained an Irish establishment. Iona is a Scottish isle, but Scotland's historic character as an Irish province is not generally realized. The original Scoti were the Irish; the original Scotia was Ireland, modern Scotland, called Caledonia by the Romans, acquiring the name of Scotia Minor or Lesser Ireland, after the Irish had conquered and colonized it. Wherever the words Scotia, Scotus and Scoti occur in Latin literature from the third to the 13th century— though the alternative term, Hibernia, was also employed, as in the phrase Hiberniæ Scoti— Ireland and the Irish are meant. Ignorance of this elementary fact has led to numerous historical errors. As time went on great abbeys arose all over Ireland, adorned with all the splendor that the Romanesque art and wealth of the period could bestow. Cashel, the most famous of them all and once a stronghold of the Irish kings, is one of the architectural wonders of the world. Rising up suddenly into sight on a high rock crowned with buildings, the simile of a Christian Acropolis at once suggests itself. As numerous as the abbeys are the stone Irish castles, Milesian and Norman in origin, built often on the foundations of ancient duns.

Towers and Crosses.— Of the celebrated round towers about 70 now remain, but the number formerly ran into hundreds, forming a vast architectural colonnade, that had no counterpart anywhere else in the world. The round towers, the later examples of which are richly decorated, are all on ecclesiastical sites and range in height from 60 to 150 feet, and from 13 to 20 feet in external diameter at the base. The tops are conical. The interior is divided into six or seven stories each lighted by a window with the exception of the top story, which has usually four windows. Intimately associated with the round towers are the sculptured crosses, of which the High Cross of Monasterboice is the chief. About 55 of these stone crosses still remain in various parts of Ireland, their dates extending from the 9th to the 13th century. All are ornamented with the Opus Hibernicum and contain groups of figures representing biblical scenes. No two crosses are alike, and what the towers have in perfection of masonry and construction the crosses have in artistic carving and symbolical design.

Metal Work.— The pagan Irish, as has been indicated, practised from time immemorial the art of working in bronze, silver, gold and enamel. From the beginning their art was exquisitely simple and refined in its decorative designs. These designs, as in their multitudinous gold ornaments, were based very largely upon the use of spiral or curving lines, arranged with the finest artistic skill, and showing in their delicate modulations of swelling or tapering forms a perfect mastery of the art of drawing. In Christian times a new motive came in. Greater richness and complexity of effect was aimed at and was attained by the use of what has been called "interlaced" designs, in which the lines of the design are interwoven with each other in patterns of great intricacy. The Cross of Cong, the Shrine of Saint Patrick's Bell, the Lismore Crozier and the Shrine of Saint Lactan's Arm, all dating from early in the 12th century, are unsurpassed examples of the interlaced pattern, which were so supremely developed in the hands of the Irish craftsmen as to be called Opus Hibernicum. These patterns were probably first used in illuminated manuscripts and they lend themselves admirably to treatment in color. An example of the combination of the exquisite spiral wreath and curves of the Pagan period and the later interlaced designs is seen in the wonderful Ardagh Chalice. The Tara Brooch and the Ardagh Chalice are perhaps the most beautiful specimens of ancient metal work to be found in the world. Both specimens are considered as belonging to the 8th century and their extraordinary delicacy and beauty have to be seen to be

appreciated. But they by no means stand alone. The National Museum in Dublin has numerous other striking examples of metal work. They supply us with a wonderful and intimate picture of the fashion and habits of the higher classes in Irish society in the period when Ireland was at the pinnacle of its wealth, dignity and learning. Among examples of Irish metal work on the Continent the 8th century Tassilo Shahie at Kremsmunster is perhaps the most interesting.

Ancient Manuscripts.— The chief evidences of its highly developed culture in that period are to be found in the ancient Irish manuscripts which have been more studied and written about than any other reliques of Irish antiquity. This was a field in which Irishmen long led the world. In the Middle Ages the richest libraries in Europe were in Ireland, and the richest libraries on the Continent were organized by Irishmen on Irish foundations. Thus Bobbio, founded by Columbanus in 612 A.D., long possessed the richest library in Italy. The nucleus of its library was formed by books brought out of Ireland by Irish monks and by treatises written by Columbanus and his fellow countrymen, and by the large gift of books made by the later Dungal. Similarly Saint Gall, possessing the richest library in northern Europe, was an establishment founded by Gall or Ceallach, another Irishman; its library was enriched by the donations of Marcus, and the transcriptions of the school of Abbot Grimoald, both Irishmen. Saint Gall, Bobbio, and Rebais and Corbie, two other Irish foundations, proved the great treasure houses of the ancient classics. When we consider the systematic destruction of Irish books that has gone on for centuries, and when we remember in the face of that fact that Irish manuscripts, whether in Latin or in Irish, remain still among the oldest and most valuable in the world, we acquire considerable respect for the ability of the Irish scribe. The illuminated manuscripts of scripture, by reason of their obvious beauty and singularity, are the best known. The Book of Durrow is the oldest specimen of Irish illumination, and the Book of Kells, some of the initial letters of which cover a whole page, is the most magnificent. The Book of Armagh, the Gospels of MacRegol, the Gospels of MacDurnan, the Book of Lindisfarne, this last executed in England, the Liber Hymnorum, the Garland of Howth, the Stowe Missal and the Gospels of Saint Chad are some of the other miracles of Irish miniature painting. The illuminated gospels and liturgical books handed down as heirlooms in the English Church are all of them true products of Irish art, having been transcribed and ornamented on Irish foundations, such as Lindisfarne, Whitby, Melrose and Malmesbury by Irish scribes and their English pupils. Still more valuable on many grounds are the other classes of Irish manuscripts, the chief merits of which lie in their literary features. The Leabhar na "h'Uidhre" or "Book of the Dun Cow" is the oldest big book in the Irish language. This book among other things has an important version of the Tain Bo, poems by Flann of Monasterboice, and many pieces of historical romance referring to the Tuatha de Danaan. The Book of Ballymote is another immense vellum compilation, whose chief interest lies in the pedigrees of the great Milesian families with the various minor clans and the families branching off from them. The Leabhar Breac or Speckled Book; the Great Book of Leacan; the Domnach Airgid, a book shrine of great beauty and antiquity, containing a fragment of the four gospels written in Latin which Petrie considered must have belonged to Saint Patrick himself; the Cathach or Book of the Battle, a highly ornamented book shrine enclosing a fragment of the Psalms in Latin, the heirloom of the Clan Conail, handed down from Saint Columbkille, who wrote it with his own hand; the Book of Leinster, containing poems, genealogies and calendars of the heroic period; the Annals of the Four Masters, compiled from older manuscripts; the Yellow Book of Lecan, a collection of ancient historical pieces, secular and ecclesiastical, in prose and verse; these are all preserved in library collections in Ireland and some of them are the chief sources and authorities for old Irish literature. Apart from these there is an enormous number of other Irish books, on vellum paper, existing not only in Ireland, but in numerous continental libraries, most of them in Irish, many in Latin, a few in Greek, of which language Irishmen alone in western Europe possessed a knowledge in the early mediæval period, many of them crowded with valuable scholia, which have been made the basis of a critical literature all its own. Irish archæology, Irish history and Irish literature are still comparatively untilled fields, yielding to intelligent labor virgin fruits that can no longer be looked for in the well- beaten classical grounds. Outside of the Greeks and Romans the Irish alone of Western peoples have handed down to the modern world a literary representation of the life of their ancestors during the period of antiquity. The results of Irish archæological research may thus be compared, corrected and supplemented by the lessons of Irish literature, and in so far as this has been done the discoveries have been remarkable. As a result of such comparative study Prof. William Ridgeway has thrown new light on both Greek and Roman history, showing the Celt as a leading figure in the early stages of both, and it has already become a truism among international students of history that a knowledge of Irish history, literature and archæology is necessary to a proper study of the early history of Europe.

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BENEDICT FITZPATRICK.

IRISH ART. At a very early period the Irish showed themselves not only capable of inventing a style of architecture for themselves, but perfectly competent to carry it to a successful issue when the proper occasion arose. During the troubled centuries preceding the Anglo-Norman invasion the Irish built round towers and oratories of a beauty of form and with an elegance of detail that charm even at the present day. Their metal work showed a true appreciation of the nature of the material, and an artistic feeling equal in kind to anything in the best ages of Greece or Italy; and their manuscripts and paintings exhibit an amount of taste which was evidently capable of reaching great artistic heights, did not the invasion of the Normans banish that peace and sense of security which are indispensable for the cultivation of the softer arts. The early churches were extremely small, and appear to have been used principally as oratories, where the priest could officiate, and to which a small square chancel was attached. The naves were covered with barrel vaults, over which was a hollow chamber called an overcroft, covered by a steep pitched roof, generally of stone, as at Cormac's Chapel, Cashel, probably the finest example in Ireland, Saint Kevin's Kitchen, Glendalough, and other places. Windows appear to have been unglazed. The monasteries form another class of building, and Professor Stokes refers to a group of seven small churches found at Inchleraun, similar to some in Asia Minor and elsewhere. The monastic cells at the Skellings are peculiar, being of beehive form, with domed stone roofs in horizontal courses, as in the early work in Greece at Mycenæ and elsewhere.

The Round towers, generally detached and placed near the church, have been a subject of much controversy; one view is that they were used as treasure houses, refuges, bell towers and for displaying lamps at night time. They all taper slightly toward the summit and are generally crowned with either a conical cap or battlemented covering. The entrance doorway was several feet from the ground. As architectural objects these towers are singularly pleasing. Their outline is always graceful, and the simplicity of their form is such as to give the utmost value to their dimensions. Few can believe that they are hardly larger than the pillars of many porticoes and that it is to their design alone that they owe that appearance of size they all present. They are among the most interesting of the antiquities of Europe.

Within the English Pale the influence of Continental art was felt during the Middle Ages, but few monuments of importance were erected. The cathedrals of Dublin, Kildare and Cashel were the most important, but the absence of parish churches is remarkable. The monasteries and friaries, principally Franciscan, are small, usually having a nave and choir, probably sometimes divided by a wooden screen, a transept and southern aisle, cloisters and a tower. The best known are those at Cashel, Kilconnell and Muckross.

Owing to the disturbances in Elizabethan times there is no domestic architecture of note, but the earlier castles built by the chieftains are interesting. The great crosses scattered throughout Ireland are important as examples of sculptural art of an advanced type. The crosses are of Christian origin and bear on all their sides reliefs representing incidents of the New Testament story.

In the working of gold early Ireland possessed skilled craftsmen and the museums of Ireland and England contain many fine specimens of brooches, pins and other jewelled ornaments. Swords, knives, etc., of the pre-Norman period show special skill in design and workmanship. The existing body of manuscripts is very large and exhibits some wonderful work in the art of illumination. The famous 'Book of Kells' is one of the world's choicest manuscripts. After the Norman invasion Irish art declined and it is only since the beginning of the present century that a healthy national life bids fair to create a new artistic era for Ireland. (See CROSSES; IRISH MUSIC; IRISH ARCHÆOLOGICAL REMAINS; MANUSCRIPTS, ILLUMINATED). Consult Champney's 'Irish Ecclesiastical Architecture'; Stokes, M., 'Early Christian Architecture in Ireland' (1878); Dunraven (Eard of), 'Notes on Irish Architecture' (1877).

IRISH CATHOLIC BENEVOLENT UNION, a fraternal organization founded in Dayton, Ohio, in 1869. It has 149 subordinate societies and 15,000 members. The benefits disbursed since organization have amounted to over $2,650,000, and during the year 1913 amounted to $54,000. The membership in the union is confined to persons of Irish extraction who are communicants in the Roman Catholic Church.

IRISH CHURCH, The. Although the introduction of Christianity into Ireland is usually reckoned from the mission of Saint Patrick, there is ample evidence that it had found its way there much earlier, probably through intercourse with Britain and the Continent. Palladius, a bishop of Britain, was sent in 430 by Pope Celestine "to the Scots believing in Christ," but he accomplished pratically nothing and returned to Britain almost immediately. Two years later Saint Patrick, who had been consecrated bishop by the same Pope, arrived in Ireland with authority to preach Christianity and established the hierarchy. He landed in Wicklow and traversed the entire country; he baptized the *ard-ri*, or high king, and many of his subjects, and achieved his mission with comparative ease and without bloodshed. His first native priests and bishops were chosen from among the chieftains, *brehons* (judges), *ollavs* (poets) and other leading men of the people, and they were ordained and consecrated with but little training. But with the organization of the hierarchy completed, he established schools, the first at Armagh, under Benignus and others at Kildare and Louth. By the end of the 5th century these schools were sending forth trained priests. By the 7th century paganism had disappeared and the old bardic schools had been supplanted by the monastic schools.

The activities of the Irish Church may be traced along two distinct lines — the maintenance of the faith in Ireland, and the spreading of the doctrines of Christianity in other lands. The missionary work of the Irish monks from the 6th to the 10th centuries, and even later, was wide-spread on the continent of Europe, and even as far away as Iceland. The upheaval in Europe following the downfall of the

Roman Empire had left Ireland practically untouched, and monastic schools there continued to flourish and send forth missionaries to the barbarous nations that had overrun southern and western Europe. Saint Columbanus, Saint Gall and many others went through the Continent evangelizing in spectacular Celtic fashion, and establishing monasteries which became in time centres of learning and industry.

In the 6th century Saint Columba and a few companions crossed to Caledonia and established the monastery on the island of Iona, whence they went to evangelize the Picts in the north of Britain. From Iona, too, went Aidan and his companions to work among the Anglo-Saxons. Practically all of Saxon England, except Kent, was won to Christianity by the labors of Irish monks, and the monasteries of Whitby and Jarrow in Northumbria, established by them, were the schools which produced the first literary efforts of Christian England.

In Ireland the monastic schools multiplied and continued to flourish until the time of the Reformation. Protestantism made little headway there and although the churches and monasteries were confiscated and turned over to the Established Church, and the proscriptive laws caused great hardships, the Church has maintained its hold on a large majority of the Irish people.

The term «Irish Church» has been used for a long time by a certain school of Anglican controversialists in support of the theory of the separate origin of the Church of England. Their contention is that the Church of Ireland was never in affiliation with the Church of Rome and that, inasmuch as England has received Christianity mainly from Ireland, the authority of the popes in England had been usurped, and England was not bound by any ties, traditional or other. This contention is based on the fact that the Church of Ireland differed from the Church on the Continent in the method of determining the date of Easter; in the form of tonsure; and in the manner of administering baptism. The difference in the manner of computing the Easter Season had caused much confusion, since the two methods prevailed in England. These differences were adjusted by the Synod of Whitby, and from that time forward England conformed to the Roman usage. To refute their contention it need only be noted that these points of difference are in minor matters of practice, while in the essential matters, the unity of doctrine and the unquestionable authority from Rome under which Saint Patrick established the Irish Church, the evidence contradicts the theory of a separate origin.

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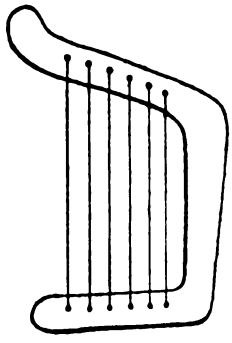
THOMAS GAFFNEY TAAFFE.

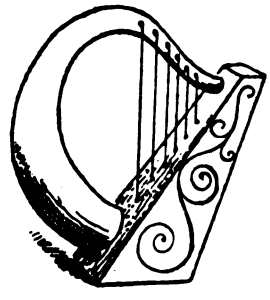
IRISH DEER. See ELK.

IRISH ELK, an erroneous name of the extinct giant fallow-deer of Europe. See FALLOW-DEER.

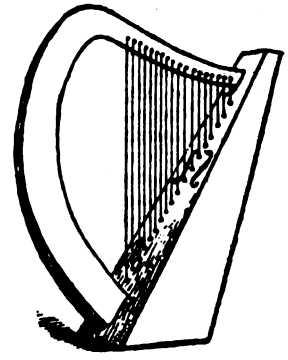
IRISH HARP (Irish *cruit;* Welsh, *crwth;* English, *crowde*). The *cruit* was originally a small harp or lyre, plucked with the fingers as in the case of the Roman *fidicula;* it was subsequently played with a bow, and is mentioned by an Irish poet who flourished about 400 B.C. It is justly regarded as the progenitor of the *Crotta.* Saint Venantius Fortunatus (530–609 A.D.) calls the *cruit* a *Crotta;* and we learn from Gerbert that it was an oblong-shaped instrument, with a neck and finger-board, having six strings of which four were placed on the finger-board and two outside it — the two open strings representing treble *G,* with its lower octave. In fact, it was a small harp, and was generally played resting on the knee, or sometimes placed on a table before the performer.



Most Ancient Form of Irish Harp.



The Cruit.



The Clairseach.

The large harp was termed the *Clairseach,* «the festive or heroic harp of the chiefs and ladies, as also of the bards,» having from 29 to 58 strings, and even 60, but as a rule 30 strings. Its normal compass was from *CC* (the lowest string on the violoncello) to *D,* in all 30 notes, that is, almost four octaves. It was generally tuned in the scale of *G,* but, by alteration of one string a semitone (effected by means of the *ceis* or harp fastener), the key might be changed to *C* or *D.* In those keys the diatonic scale was perfect and complete, similar to ours now in use. The ancient Irish played the treble with the left hand and the bass with the right.

Among early representations of the Irish

harp we find one in a manuscript of Saint Blaise, quoted by Gerbert, dating from the close of the 9th century. Another one is on the panel of a sculptured cross at Ullard County, Kilkenny, dating from the 10th century, and which is «the first specimen of the harp without a fore-pillar that has hitherto been found outside of Egypt.» There is a good representation of an eight-stringed harp on the metal shrine of Saint Maedhoc, dating from the 9th century. The so-called «Brian Boru's Harp,» though not dating from the time of Brian, has a venerable antiquity, and belonged most certainly to the royal family of O'Brien. It has 30 metallic strings, having a compass from *C* below the bass stave to *D* above the treble stave.

The 19th century saw the introduction of chromatic harps with pedals and in recent years an improved harp in two sizes has been built by the American, Melville A. Clark. Consult Armstrong, R. B., 'The Irish and the Highland Harps' (Edinburgh 1906).

IRISH LAND LAWS. Under the Brehon laws, when the people of Ireland were divided into tribes, the land was usually the property of one of the four or five tribes which were the strongest in Erin. A large portion was given to the king or chief of the tribe, then divided among the clans that made up the tribe. Here again a large portion was given to the chief of the clan and then divided among the septs. The chief of the septs received the largest portion of the amount set apart for the sept. The free tribesmen, after the chief, received the greater part of the sept lands.

Some of the tribesmen, the Ceil, owned cattle, some, the Daer and Saer, were loaned cattle by the chief. The Fuidhir were the tenants who performed the manual labor.

When a chief died, the tribesmen distributed his land among his descendants, and when a tribesman died, the chief distributed his property. After England took possession of Ireland, the land tenure in a large part of the island continued to be administered under the communal basis of Brehon laws; but within «The Pale» the English feudal system prevailed; there the king alone owned the land and the tenants derived ownership from him. Gradually England forced her land laws upon Ireland. This was done by driving the «rebellious Irish» out of certain counties, King's, Queen's, then out of all Ulster, when the Ulster plantation was established, in 1607. Other confiscations and dispossessions took place until all Ireland came under the English law. Cromwell took forcible possession of the best lands of Munster and Leinster and a large part of Ulster, and divided the whole among his soldiers. Although some of these lands were restored later, more was retaken, by act of Parliament, under William III. The chiefs and leaders among the people of Ireland were deprived of their lands and the friends of the king of England or of the English government, were given Irish possessions as a reward for military or political services. Thus the problem associated with the Irish land question virtually began with the entrance of Henry II into Ireland. In later times under the penal laws no Catholic could own land, and that in a country predominantly Catholic. The effect of this proscription on a proud and sensitive race need not be described. With the Irish owners deprived of their lands there was instituted the system of «landlordism» which has been a hindrance to Ireland's progress. The majority of those who owned the land did not live upon it, and usually the money received for rent was spent in a foreign country. This absentee proprietorship, involving the total lack of personal contact between owner and tenant, was a further root of bitterness. The landlord owned only the land; the houses had to be built and all improvements had to be made by the tenant and at his own expense. The more a holding was improved, the more rent was demanded. The «middle men» who held lands under the owner and sublet to tenants were the means of increasing the burdens of the unhappy peasantry. The commission under Lord Devon, in 1843, to investigate conditions in Ireland, revealed an alarming state of affairs, and the famine of 1846–48 brought the Irish land question to the notice of the whole civilized world, even many of the English statesmen who had censured what they had regarded as Irish shiftlessness being astonished when they learned the nature of the land laws which gave power of eviction without any remuneration for improvements; and the wonder was that so much thrift and industry existed. In 1847 Lord John Russell endeavored to pass an act to protect the tenant against loss by eviction. This measure failed, and others accepted by Parliament later proved ineffectual. Two years after the terrible devastation by famine, the Tenant Right League was organized in Dublin, and its members began a systematic campaign to elect to Parliament members pledged to support measures for the relief of the tenants. The Land Acts of 1860, under the Palmerston ministry, may be said to have resulted from the agitation kept up by the Tenant Right League. Various other organizations for the betterment of the people of Ireland were established, and among them were «physical force» societies. In 1870, under the Gladstone ministry, the first of really ameliorative measures was passed, under which three principles were established: that a tenant could not be evicted if his rent were paid; that this non-payment must be for at least three years; and that if the tenant chose, he might sell his improvements. This purchase of improvement clause was a great advance in favor of tenants' rights. The next act was passed by Gladstone in 1881, giving the tenant a possessory right to his holding except for the non-payment of rent, and established a land commission to fix fair rents. The Land League in various parts of the world, especially the United States, continued the agitation and brought the remaining grievances of the Irish tenants before the whole world. The Ashbourne Act of 1885 provided for the purchase of the lands by the tenants and nearly $25,000,000 was set aside for that purpose. Later a like amount was added. A comprehensive scheme of land purchase was an integral part of Gladstone's abortive Home Rule bill of 1886. In 1891 the Balfour land purchase bill was passed and nearly $150,000,000 was provided for purchase. In 1896 this law was improved; but for various reasons all the laws enacted by Parliament proved effective only in so far as the bringing of the matter to the notice of fair-minded statesmen. (See LAND LEAGUE). With the culminating act in

the series definite settlement may be regarded as having been reached, when the land purchase bill was enacted 14 Aug. 1903, whereby the tenant may purchase and own land and the government will, under certain and fair conditions, be responsible for the payment. To George Wyndham, who as chief secretary for Ireland, prepared the bill, the credit is largely due for the passage of the act. (See WYNDHAM, GEORGE.) Consult Reports on the "Land Purchase" acts for relief of Ireland; Hansard's 'Parliamentary Debates'; Grinnell, 'The Brehon Laws'; Maine, 'Lectures on the Early History of Institutions'; Fisher, 'History of Landholding in Ireland'; Richey, 'The Irish Land Law'; Godkin, 'The Land War in Ireland'; Richey, 'The Irish Landlord'; 'Report of the Devon Commission'; Cherry and Maxwell, 'Irish Land Purchase Acts, 1880–1904'; Bonn, 'Modern Ireland and Her Agrarian Problem' (trans. by Rolleston); McCarthy, 'Irish Land and Irish Liberty.' See GREAT BRITAIN — THE ENGLISH LAND LAWS; HOME RULE.

IRISH LANGUAGE, Society for the Preservation of, an organization established first as the Philo-Celtic Society in 1873, in Boston, Mass. The object is to foster the study of the Gaelic language so that it may again be one of the spoken languages of the Irish people. The headquarters are now in Dublin, where the organization was established in 1876. It has a number of branches in different parts of the United States.

IRISH LEAGUE OF AMERICA. See UNITED IRISH LEAGUE OF AMERICA.

IRISH LITERARY REVIVAL, the name given to that particular development of the Celtic Renaissance which, toward the end of the 19th century and during the 20th century up to the present date (1918), resulted in the production of a large, valuable, and characteristic body of literature, written in English by Irishmen and Irishwomen, primarily for their own people, on subjects mainly but not exclusively Irish in character. Put in another way, it may be said that the Irish literary revival means the creation of a distinctively national Irish literature, expressed in the English language. The success attained amply demonstrates the possibility and even the advantage of the employment of that medium for the purpose. This splendid efflorescence of literary activity manifested itself in the usual forms of poetry, drama, short-story, novel, and essay. It should be noted that it synchronized with a general uplift not only in intellectual emancipation but also in economic progress, agrarian reform, improvement in agricultural methods, and the revival of industry — in a word, with a more hopeful outlook on life.

While there is no doubt that the increasing attention focused by the Celtic Renaissance on old Irish legends and traditions, on the ancient pagan gods and other supernatural beings of Erin, on the hero tales and love episodes of the Red Branch and Ossianic cycles of romance, and on Irish fairy lore and folk-lore, coupled with the other revelations made by scholars concerning the wealth of literary material stored up in the almost forgotten manuscripts of the past, was the general cause of the Irish Literary Revival, it is difficult to assign a specific date or a given work as its starting point and proximate cause. At no period, even before the publication of Zeuss's 'Grammatica Celtica' in 1853, was old Irish literature or the themes it suggested entirely neglected. Macpherson's 'Poems of Ossian' (1760–63), forgeries though they were in whole or in part, achieved a European reputation, and Charlotte Brooke (c. 1750–1803), a patient delver in the mines of antiquity, had, in her 'Reliques of Irish Poetry' (1789), unearthed treasures, dating back to the 3d century of our era, before which she stood enraptured. Other collectors were James Hardiman, Rev. Dr. Drummond, Thomas Crofton Croker, Patrick Kennedy, Lady Wilde, Jeremiah Curtin, Lady Ferguson, and Douglas Hyde. Credit must also be given to various learned societies, whose 'Transactions' show consistently solid results, and to a number of individual scholars, whose researches covered with accuracy an extensive field.

This, however, was all pioneer work, scholarly and necessary, but, as far as most of it was concerned, not belonging to the domain of literature proper. Thomas Moore's 'Irish Melodies' (1808 *et seq.*), although primarily produced for English consumption, were perhaps the first real revelation of the Irish spirit in English literature. Moore's services in this respect have been sometimes strangely underrated; but it should not be forgotten that he not only sang of the episodes of the struggle between Saxon and Celt and of the earlier glories of Malachy and Brian the Brave, but that he also helped to keep alive enthusiasm for the memory of a still remoter past by celebrating the coming of the Milesians to Ireland, and those later but still olden periods when skilled generals led the Red Branch Knights to battle and when Tara was as yet the seat of mighty kings. Jeremiah Joseph Callanan (1795–1829) and Edward Walsh (1805–50) also caught to some degree the peculiarly Irish note. In one limited sense it may be said that the Revival dates from the Young Ireland party, for its members endeavored in their weekly organ, the *Nation* (1842–48), to reawaken the fast decaying spirit of Irish nationality, and, as a means to that end, taught that Ireland must be conscious of its past. The *Nation* writers, however, were in general too much engrossed in political strife and in the revolt against English domination to go back beyond the Anglo-Norman invasion of the 12th century for their subjects. Their view was bounded by the struggle of Ireland against conquest in the past and its then existing struggle against Anglicization; though here again it ought to be noted that one of the most versatile of them, Thomas D'Arcy McGee (1825–68), found it in him to sing of the mighty race which flourished in Ireland more than 2,000 years ago. The greatest of the *Nation* poets was James Clarence Mangan (1803–49), and his voicing of the spirit and much of the manner of Celtic Ireland makes him one of the direct forerunners of the literary movement now under notice. Another forerunner was Sir Samuel Ferguson (1810–86), a distinguished Gaelic scholar as well as a poet, whose 'Lays of the Western Gael' (1865), 'Congal' (1872), and 'Poems' (1880) tended strongly to that restoration of ancient legend as a groundwork and a theme for literature which later became

one of the distinguishing marks of the Revival. A potent force in the same direction was that of Dr. George Sigerson (b. 1839), a man of protean intellect, who was both a herald of the new movement and an active participator in it when it came. His special standing is as a translator of the old Gaelic poets. As far back as 1860 he published the text of some 50 Irish poems, with a metrical rendering into English, the whole forming the second part of the 'Poets and Poetry of Munster,' the first volume of which, contributed by Mangan, had made its posthumous appearance in 1850. Dr. Robert Dwyer Joyce (1830–83) was also early in the field. His 'Ballads, Romances, and Songs' came out in 1861. His 'Deirdre,' a blank verse poetical rendering of the sorrowful fate of the children of Usna, which appeared at Boston, Mass., in 1876, had an enormous success, and was followed by 'Blanid' in 1879. His brother, Dr. Patrick Weston Joyce (1827–1914), a splendid Gaelic scholar, published in 1879 'Old Celtic Romances,' translated from the Gaelic into English prose. The 11 tales which make up this collection, some of which were then for the first time turned into English, proved a wonderful source-book for later comers. Perhaps, however, the work which was destined to exercise the greatest influence of all was the 'History of Ireland,' by Standish O'Grady (b. 1846), the first volume of which, 'The Heroic Period,' appeared in 1878, and the second, 'Cuculain and his Contemporaries,' in 1880. Nothing more unlike what is generally understood by the term history could be well conceived than O'Grady's book. He accepts, or appears to accept, myth, legend, and tradition with a positively childlike faith; for him the gods and demigods, the visionary heroes and kings, are instinct with life, and he gives us as sober historical fact all the incidents of the epic entitled 'The Cattle-Spoil of Cooley' and of the titanic war waged by Queen Maeve of Connacht against King Conchobar and the Red Branch Knights of Ultonia, introducing incidentally all sorts of myth and folk-lore, as well as the story of Deirdre and the sons of Usna. In these pages the past is made to live again, and Fergus and Ferdiad, Conchobar and Laeg, Maeve and Emer are brought before us so vividly that we forget, in the sweeping, breathless, and fascinating narrative, the many improbabilities which surround the story. The greatest figure of all is Cuculain, whose whole astonishing career is set before us, and the book comes to a close with his death. The critics, as a matter of course, fell foul of this romance masquerading as history; but the seed had been sown, and it was to bloom and ripen into a wonderful harvest. So great was the subsequent effect of this Bardic history on literary production that, in virtue of it, O'Grady is sometimes styled the Father of the Irish Literary Revival, and, to judge by the obligations afterward expressed to him by some of its principal exponents, the title seems not wholly undeserved.

Hitherto the literary labor in the field of Ireland's past had been largely individual: soon it was to take on a more concerted form. Among the Irish in exile there is often a stronger national feeling than among the Irish at home. It is not, therefore, surprising that it is in the centre of English power, in London itself, that we find the first nucleus of an abiding Anglo-Irish literary organization. Out of the Southwark Junior Irish Club, which in the early 80's had achieved more than local fame because of the interest taken in it by a few enthusiastic young Irishmen settled in the world's metropolis, there was developed in 1883 the Southwark Irish Literary Club. True to its motto, "Spread the light," this body carried on for several years a highly successful propaganda, and attracted to its meetings many of the leading literary workers of the day. In January 1892, it was formally decided to enlarge the scope of the organization, and accordingly the Irish Literary Society of London came into being and, under the new name, began in that year its eventful career. Its inaugural lecture, however, was not delivered until March 1893. The lecturer was Rev. Stopford Augustus Brooke (1832–1916), and he chose as his subject "The Need and Use of Getting Irish Literature into the English Tongue." This discourse, afterward published as a booklet, is a manifesto of the object and aims of the Society. Sensing the future, Brooke laid emphasis on the necessity of translation, so that the coming Ireland might have ready to her hand all the materials for an Irish literature, written in English, and thus be able to "send another imaginative force on earth which may (like Arthur's tale) create Poetry for another thousand years." Thereafter the Society was very active. One effect of Brooke's advice was the formation of the Irish Texts Society and the Irish Folk Song Society, besides the enterprise of Sir Charles Gavan Duffy in publishing the books which constitute the "New Irish Library." Not only to Greater London but also to other parts of Great Britain did the passion for literary organization spread. Similar, though smaller, Irish literary societies were set up in rapid succession at different British centres. Ireland itself was not behindhand. At Belfast, the Young Ireland Society, established in 1883, rendered notable service. At Cork, the Historical and Archæological Society, founded in 1891, regularly produced a monthly *Journal*, which was a marvel of research. A similar society was organized at Waterford in 1894. At Dublin, the Pan-Celtic Society was founded in 1888, and speedily secured a band of earnest workers. 'The Lays and Lyrics of the Pan-Celtic Society,' containing contributions from many of its members, made its appearance in 1889. The Pan-Celtists held together for a few years. Eventually, most of them joined the National Literary Society, originated by John T. Kelly and William B. Yeats, and formally established at Dublin in June 1892. In August, the inaugural address, on 'Irish Literature: its Origin, Environment, and Influence,' was delivered by Dr. George Sigerson, and gave the keynote of the purpose of the organization.

The year 1892, which saw the foundation of the two great societies at London and at Dublin, may be taken as the definite date of the focus of Irish co-operation for literary objects. By that time the events following the fall (1890) and the death (1891) of Parnell had abstracted the Irish mind from that all-absorbing attention to politics in which for the 20 previous years it had been almost exclusively engrossed, and things literary and artistic had

therefore a fairer chance of receiving due consideration.

Already, however, as we have seen, there was very definite evidence of concerted action in 1889, when the Pan-Celtists brought out their book, and the year before that, 1888, had seen the publication of the 'Poems and Ballads of Young Ireland,' which may be regarded in a sense as one of the first fruits of the revival. The latter-mentioned little book, dedicated to John O'Leary and the Young Ireland societies, contained pieces by Sigerson, Hyde, Todhunter, T. W. Rolleston, Katherine Tynan, Ellen O'Leary, Rose Kavanagh, and Yeats.

If Sigerson's first permanent contribution to literature in 1860 did not attract all the attention it deserved, he yet never lost heart or hope. Not only did he collaborate in the production of 'Poems and Ballads of Young Ireland' but also in 'The Revival of Irish Literature' (1894). His second great unaided work, 'Bards of the Gael and Gall' (1897), was accorded a generous reception. This wonderful volume contains 141 poems, going back to the very days of the Milesian invaders and coming down through all the great epochs of Irish history to the 18th century. It is preceded by a learned introduction of 91 pages, in which the claims of the early Irish poets to the invention of an independent system of versification and to several metrical devices, subsequently copied by other nations, such as rhyme, assonance, alliteration, blank verse, and the burthen, are, apparently, successfully vindicated. In his translations Sigerson has not only caught the spirit but he also reproduces the manner of the originals, and illustrates in practice the intricate and complicated technique of Gaelic verse. From whatever angle viewed, 'Bards of the Gael and Gall' is a noteworthy book. As recently as 1913, Sigerson published 'The Saga of King Lir.' Dr. Douglas Hyde (b. 1860), president of the Gaelic League for nearly a quarter of a century from its inception in 1893, and since 1909 professor of Modern Irish at University College, Dublin, is better known as a Gaelic than as an English writer, but his work in English is by no means negligible. Besides, it must always be borne in mind that the Gaelic movement proper exercised an undoubted stimulus on the Anglo-Irish revival. Hyde's first volume of folk-tales, published in 1889, was written in Irish; but 'Beside the Fire' (1890), folk-tales in prose, had not only the Gaelic text but also a translation into Hiberno-English idiom, effectively employed, as had the poems, 'The Love Songs of Connacht' (1893), 'Songs Ascribed to Raftery' (1903), and 'The Religious Songs of Connacht' (1906). Three poems, 'Deirdre,' 'The Children of Lir,' and 'The Fate of the Children of Tuireann,' appeared as 'The Three Sorrows of Storytelling' in 1895. In addition to his plays in Irish, Hyde wrote several plays in English. The same year (1888) which saw the 'Poems and Ballads of Young Ireland' saw also the first book of distinctly Irish verse by Dr. John Todhunter (1839–1916), namely, 'The Banshee and Other Poems,' and this was followed, in 1896, by 'Three Bardic Tales.' A distinguished man of letters, Todhunter is more fully treated in 'Irish Literature in English' (q.v.). Besides his five pieces in 'Poems and Ballads of Young Ireland,' Thomas William Hazen Rolleston (b. 1857) contributed to both series of 'The Book of the Rhymers' Club' (1892 and 1894). 'Deirdre' (1897) shows the attraction of that great subject for him as for so many others. In 1909, he published a volume of verse, entitled, 'Sea Spray.' His prose contributions to the Revival are 'Imagination and Art in Gaelic Literature' (1900), 'The High Deeds of Finn' (1910), and 'Myths and Legends of the Celtic Race' (1911). He joined Stopford Brooke in editing 'A Treasury of Irish Poetry' (1900), and he had many other activities, chiefly in connection with German and Greek literature. Katherine Tynan Hinkson (b. 1861) secured considerable reputation in 1885 with 'Louise de la Vallière and Other Poems,' in which there are five or six pieces of a national character. Her second book of verse, 'Shamrocks' (1887), gave still more attention to Irish themes, as did her third, 'Ballads and Lyrics' (1891). She published many other poetical works and numerous novels, as well as essays and sketches, and two volumes of 'Reminiscences.' Her religious verse is greatly admired. A poet of firm fibre, Mrs. Hinkson has written books that will endure. The poems of Ellen O'Leary (1831–89) were edited by Rolleston in 1891 under the title of 'Lays of Country, Home, and Friends.' Rose Kavanagh (1859–91) was represented in the 'Lays and Lyrics of the Pan-Celtic Society.' Some years after her early death her collected poems, with a memoir, were published in 'Rose Kavanagh and her Verses' (1909). Her poetry is thoughtful, sincere, and full of promise.

One of the outstanding figures of the Revival is William Butler Yeats (b. 1865). Pressman, essayist, storyteller, poet, playwright, and propagandist, he was already well known in the literary world, when, in 1889, he broke entirely new ground with the publication of 'The Wanderings of Oisin and other Poems.' This book is not, as has been sometimes stated, the starting point of the Revival, but it revealed a new personality and opened up a new world of material for poetry. It is written in a style, to use its author's own words, "musical and full of colour," it is highly artistic, and it is remarkable for the true voicing of the Celtic spirit. There followed in 1892 'The Countess Cathleen and Various Legends and Lyrics,' in which a still more intense effort is made to express the heart of his country. Several years were then given up to prose. 'John Sherman,' a novel in miniature dealing with life in Sligo and London, and 'Dhoya,' a story of ancient Ireland, had already appeared in 1891. 'The Celtic Twilight,' a collection of ghost and fairy lore, was published in 1893, and was reissued with additional matter in 1902. To 1897 belong the various tales entitled 'The Secret Rose' and 'The Tables of the Law.' 'Stories of Red Hanrahan,' taken from 'The Secret Rose,' was published separately in 1904, and the two were brought out in one volume with 'Rosa Alchemica' in 1913. He returned to poetry in 1899 with 'The Wind among the Reeds,' in which he reaches the high-water mark of that mystic symbolism with which his name has been associated. This manner is continued in 'In the Seven Woods' (1903), 'The Green Helmet and other Poems'

(1910), and, to a less extent, in 'Responsibilities' (1914). His latest book is 'Per Amica Silentia Lunae' (1917). As well as contributing to 'Literary Ideals in Ireland' (1899) and to 'Ideals in Ireland' (1901), he wrote many other essays, including 'Ideas of Good and Evil' (1903), 'Discoveries' (1907), 'Poetry and Ireland' (1908), 'J. M. Synge and the Ireland of his Time' (1911), the last three, with other essays, constituting 'The Cutting of an Agate' (1912). He published many critical and propagandist articles in *Beltaine*, the organ of the Irish Literary Theatre (1899–1900), and in *Samhain* and *The Arrow*, which were in turn the "occasional periodical" of the Irish National Theatre (1901–08). Yeats's plays are based either on the myths and legends of the Heroic Age of Ireland or on peasant and fairy lore. The first of them to be performed was 'The Land of Heart's Desire,' produced at the Avenue Theatre, London, in 1894. His most successful one, 'Cathleen ni Houlihan,' a folk-drama in prose, was staged in Dublin in 1902 by the Irish National Dramatic Company. Others of his plays are 'The Countess Cathleen' (1892, performed 1899), 'The Shadowy Waters' (1900, performed 1901), 'Where there is Nothing' (1903, rewritten by Lady Gregory as 'The Unicorn from the Stars,' 1907), 'The King's Threshold' (1903), 'On Baile's Strand' (1904), 'The Hour Glass,' a morality (1904), 'Deirdre' (1906), 'The Golden Helmet,' a farce (1908). In collaboration with George Moore he wrote 'Diarmuid and Grania,' produced in 1901, and with Lady Gregory, 'The Pot of Broth' (1903). In 1911, in recognition of his services to literature, Yeats was granted a Civil List pension of £150 a year.

Another of the great names of the Revival is that of George W. Russell (b. 1867), mystic, painter, poet, essayist, economist, and leader of thought, who is generally known by his diminutive pseudonym, Æ. Beginning his career as a bookkeeper in a Dublin department store, he became in 1897 an organizer, and later assistant secretary, of the Irish Agricultural Organization Society, and in 1905 he was appointed editor of *The Irish Homestead*, the official organ of that body. His earliest collection of poetry, 'Homeward: Songs by the Way,' appeared in 1894, and was followed by 'The Earth Breath and other Poems' (1897), 'Nuts of Knowledge' (1903), 'The Divine Vision' (1904), 'By Still Waters' (1906). His 'Collected Poems' came out in 1913. The World War having inspired him afresh, he produced 'Gods of War and other Poems' in 1915. Æ is a mystic and a pantheist. In his creed, man is of divine origin, and the soul in its quest for union with the spirit of life tends always to return to the Oversoul, to be absorbed in the Universal Spirit. His poetry, which appears to be absolutely sincere, is the record of the ecstatic states which come to the soul in its search for the Infinite, "the high Ancestral Self," and consequently shows impatience with modern social conditions, and is in one sense a poetry of protest. It is, however, mainly pantheistic, for, in its author's conception, nature is divine and deity is everywhere. It is therefore essentially a poetry of nature, and delights to chant the beauty and the glory of the world around us. In common with "John Eglinton," William Larminie, and Yeats, he contributed to 'Literary Ideals in Ireland' (1899) and, with Hyde, Yeats, Standish O'Grady, and George Moore, to 'Ideals in Ireland' (1901). His other prose works include a brochure containing a reprint of two essays from *The Irish Theosophist*, namely, 'The Future of Ireland and the Awakening of the Fires' and 'Ideals in Ireland: Priest or Hero?'; 'The Mask of Apollo,' a volume of mystic stories (1904); 'Some Irish Essays' (1906); 'The Hero in Man' (1909); 'The Renewal of Youth' (1911); and the booklet, 'Co-operation and Nationality' (1912), which, exhibiting as it does the essence of his social teaching, is sometimes termed the bible of the Irish co-operator, and was ultimately expanded into 'The National Being: Some Thoughts on an Irish Polity' (1916), in which he endeavors to show that none but a co-operative commonwealth is suited to a nation like Ireland. 'Imaginations and Reveries' (1915) is a representative but not complete collection of his prose. Æ's solitary dramatic work is 'Deirdre,' a three-act play in prose.

William Larminie (1849–1900) published two volumes of verse, 'Glanlua and other Poems' and 'Fand and other Poems.' He also brought out a collection of 'West Irish Folk Tales.' He left in manuscript a translation of the Latin writings of John Scotus Erigena. At his best Larminie takes high rank as a poet. Lionel Johnson (1867–1902), though born in England, was of Irish family, and, on that account and because of the character of most of his works, he is usually classed among the writers of the Revival. Like Rolleston, Todhunter, and Yeats, Johnson was represented in both series of 'The Book of the Rhymers' Club' (1892 and 1894). His other works are 'Poems' (1895); 'The Art of Thomas Hardy' (1896); 'Ireland, with other Poems' (1897); the posthumously published volume of essays 'Post Liminium' (1911); and 'Collected Poems' (1915). A convert to Catholicity in 1891, Johnson shares with Katharine Tynan Hinkson the distinction of having written excellent religious poetry. Alfred Perceval Graves (b. 1846), so well known as the author of the rollicking and humorous ballad-song, 'Father O'Flynn,' published 'Songs of Killarney' as early as 1873, and during a long literary life devoted himself to Irish themes. Patrick Joseph McCall (b. 1861), a Dublin merchant, is author of several books of racy verse, including 'Irish Noinins' (1894), 'Songs of Erinn' (1899), 'Pulse of the Bards' (1904), and 'Irish Fireside Songs' (1912). His fairy legends, 'The Fenian Nights' Entertainments,' are extremely interesting. Elinor Mary Sweetman published 'Footsteps of the Gods and other Poems' (1893); 'Palms'; and 'The Wild Orchard' (1911). Francis Arthur Fahy (b. 1854) wrote some delightful lyrics, many of which, like 'The Ould Plaid Shawl,' 'Song of the Irish Fiddler,' and 'The Irish Lullaby,' were set to music. A collection of his verse, under the title of 'Irish Songs and Poems,' appeared in 1887. Alice Furlong published a slender volume of poems, of much promise, 'Roses and Rue' (1899). She also wrote serial stories and a book of Irish fairy narratives, entitled 'Tales of Fairy Folk, Queens, and Heroes' (1907). Dora Sigerson Shorter (d.

1918), daughter of Dr. George Sigerson, married in 1897 Clement K. Shorter, editor of *The Sphere*. Something of a painter and a sculptor, she was also a voluminous writer and published several books of poetry, as well as novels, short stories, and fairy tales. Her poems won the enthusiastic praise of George Meredith. Thomas Boyd (b. 1867) brought out, in 1906, a collection of 'Poems,' which were greatly admired. One of his finest single pieces, 'The Lianhaun Shee,' was made famous by being copied into William Sharp's 'Lyra Celtica,' Brooke and Rolleston's 'Treasury of Irish Poetry,' and other anthologies. William A. Byrne is the author of many graceful verses, collected in 'A Light on the Broom' (1901). James H. Cousins, an Ulster poet, wrote several books of verse. His poetic drama, 'The Sleep of the King,' and his tragedy of the sea, 'The Racing Lug,' were among the early productions (1902–03) of the Irish National Dramatic Company. A collection of the poems of Frances Wynne (1863–93) was published under the title of 'Whispers' in 1890. William Rooney (1873–1901) was a constant contributor of both verse and prose to Dublin and Belfast papers. His 'Poems and Ballads' were collected and published in 1902, and his 'Prose Writings' in 1909. Nora Hopper (Mrs. W. H. Chesson, 1871–1906) published 'Ballads in Prose' (1894), 'Under Quicken Boughs' (1896), 'Songs of the Morning' (1900), and 'Aquamarines' (1902), as well as several novels. Her lyric, 'The King of Ireland's Son,' was adjudged by Fiona Macleod to be one of the "three loveliest and most typical lyrics of our time," the other two being Yeats's 'Innisfree' and Moira O'Neill's 'Corrymeela.' "Moira O'Neill" (Mrs. Nesta Higginson Skrine), author of 'An Easter Vacation' (1893) and 'The Elf Errant' (1895), sprang into sudden fame with 'Songs from the Glens of Antrim' (1900), a small book containing 25 short poems. Its popularity arose from the fact that it voices, in the natural language of the peasant, the peasant's discontent with strange surroundings and his homesick longing for the scenes of his former daily life. She showed that the Hiberno-English spoken in the northern province was as applicable to literature as the better known varieties of the south and the west. "Ethna Carbery's" posthumously published book, 'The Four Winds of Eirinn' (1902), is also distinguished for its folk-poetry, written in the language of the people and addressed to a strictly Irish public. She displays the most ardent patriotism and a great love for the traditions of her country. "Ethna Carbery" was the pen-name of Anna Isabel Johnston (1866–1902), whose greatly regretted death occurred a few months after her marriage to Seumas MacManus. Her short stories and sketches were collected and published in two small volumes, 'The Passionate Hearts' (1903) and 'In the Celtic Past' (1904). Charles Weekes has two books of verse to his credit, 'Reflections and Refractions' (1893) and 'About Women' (1907), the first mystic, the second satiric. Frederic Herbert Trench wrote 'Deirdre Wed and other Poems' (1900), 'New Poems' (1907), and 'Lyrics and Narratives' (1911). Darrell Figgis, critic, poet, and politician, and in the last-mentioned rôle destined by fate to strange and stormy vicissitudes, published many volumes both of verse and prose, including 'A Vision of Life' (1909), 'The Crucibles of Time and other Poems' (1911), 'Jacob Elthorne' (1914), and 'The Mount of Transfiguration' (1915).

A signal service was rendered to literature by Æ when, in 1904, he edited a small volume entitled 'New Songs,' containing selections from eight young Irish poets, many of them members of the Hermetic Society and most of them at that time but little known to fame. These were Alice L. Milligan, Eva Gore-Booth, Susan L. Mitchell, Ella Young, Padraic Colum, "Seumas O'Sullivan," Thomas Keohler, and George Roberts. Alice L. Milligan collaborated with her father, Seaton F. Milligan, a distinguished antiquary, in 'Glimpses of Erin' (1888). She also wrote largely for *United Ireland, The United Irishman, Sinn Fein,* and *The Shan van Vocht,* a little periodical which she and "Ethna Carbery" established at Belfast. Alice Milligan's heroic drama, 'The Last Feast of the Fianna,' was produced by the Irish Literary Theatre in 1900. She is the author of 'Hero Lays' (1908), of several songs which have been set to music, and of 'A Royal Democrat,' a political novel. Eva Gore-Booth wrote several books of verse, of which 'The Egyptian Pillar and other Poems' (1908) may be taken as typical. Susan L. Mitchell, in addition to 'The Living Chalice' (1908), which is distinguished for its imagery and symbolism, wrote 'Aids to the Immortality of Certain Persons in Ireland,' in which she humorously but gently satirized some of the better known participators in the Revival, and showed that she possessed the gift of parody. Ella Young's 'Poems' (1906) display great beauty of phrase and a deep religious sentiment. "Seumas O'Sullivan" (James Starkey, b. 1880), an exponent of mysticism, wrote poems of great spirituality and almost perfect technical skill. Among his works are 'The Twilight People' (1905) and 'The Earth Lover and other Verses' (1903). His book of essays, 'Mud and Purple' (1918), attracted considerable attention. Thomas G. Keohler, in 'Songs of a Devotee' (1906), and George Roberts, in 'White Fire' (1908), carried on the mystic side of the Revival. Padraic Colum is treated later, among the dramatists. Joseph M. Campbell, artist and dramatist as well as poet, is a realist. Among his published books of poems are 'Songs of Uladh' (1904), 'The Mountainy Singer' (1909), and 'Earth of Cualaun' (1917). 'Mearing Stones' (1911) is a series of his impressions in prose. His tragedy, 'Judgment' (1912), is an analysis of life in Donegal. Thomas MacDonagh (1877–1916), who was court-martialed and shot after the rebellion in Dublin in 1916, was critic, dramatist, and poet. Among his verses are 'Through the Ivory Gate' (1903) and 'Songs of Myself' (1910). In a poetic tragedy, 'When the Dawn is Come' (1908), he seems to foretell his own untimely end. 'Thomas Campion and the Art of English Poetry' (1913) and 'Literature in Ireland' (1916) are two of his valuable studies. Norreys Jephson O'Connor wrote a book of Irish poems 'Beside the Blackwater' (1914), and a play, dealing with fairy life, entitled 'The Lennan Sidhe' (1916). One of the latest of the Irish

poets, Francis Ledwidge (1891–1917), known as "the peasant poet of Meath," had a great variety of experiences in his all too short career. In October 1914 he enlisted in the Inniskilling Fusiliers, and he was killed in action in Flanders on 31 July 1917. His two books of verse, 'Songs of the Fields' (1916) and 'Songs of Peace' (1917), were great in performance and still greater in promise. He gave every evidence of being one of those poets who are born, not made.

Owing to extrinsic, as well as intrinsic, causes, the most widely known feature of the Irish Literary Revival is undoubtedly its drama. In its initial stages, the dramatic movement was not of entirely Irish origin. It owed much to the influence of Ibsen, and still more to the fact that plays of a certain type had no chance of being produced on the so-called "commercial" stage of London. One of the sufferers from this policy of exclusion was Edward Martyn. Being a man of independent means and anxious to secure the presentation of his plays, 'The Heather Field' and 'Maeve,' he joined forces with Yeats, George Moore, Lady Gregory, Æ, "John Eglinton," and others, and founded the Irish Literary Theatre in 1899, under the auspices of the National Literary Society of Ireland. A company of English actors and actresses, having been assembled in London, made their rehearsals there, crossed the channel, and produced on 8 May 1899, in the Antient Concert Rooms, Dublin, Yeats's play, 'The Countess Cathleen.' The following evening Martyn's 'The Heather Field' was put on. During the second season (1900) the venue was the Gaiety Theatre, Dublin, and there Moore's 'The Bending of the Bough' (adapted from Martyn's 'The Tale of a Town'), Martyn's 'Maeve,' and Alice Milligan's 'The Last Feast of the Fianna' were staged. The third season (1901) had the advantage of the direction of F. R. Benson, and saw the production of 'Diarmuid and Grania,' a heroic play in prose, written in collaboration by Yeats and Moore. Douglas Hyde's 'Casadh-ant-Sugain' (The Twisting of the Rope), a one-act play in Irish, was presented by a specially trained company of Gaelic speakers, with the author in the principal rôle.

In the meantime William G. Fay and his brother, Frank J. Fay, actors of considerable experience, had been training a company of Irish amateur players, known as the Ormond Dramatic Society; and on the conclusion of the third season of the Irish Literary Theatre, Martyn and Moore withdrew, and the Fays, Yeats, and Lady Gregory formed the Irish National Dramatic Company out of the Ormond Dramatic Society. The first performance of the new company was given at Saint Teresa's Hall, Clarendon street, Dublin, on 2 April 1902, the bill consisting of Yeats's 'Cathleen-ni-Houlihan' and Æ's 'Deirdre.' Later in the same year they moved to the Antient Concert Rooms, and there produced again the same two plays, as well as four new ones, namely, 'The Sleep of the King' and 'The Racing Lug,' by James H. Cousins, 'A Pot of Broth,' by Yeats and Lady Gregory, and 'The Laying of the Foundations,' by Frederick Ryan. In 1903 control passed from the Fays, who still, however, remained with the company, and The Irish National Theatre Society, with Yeats as president, was formed, and gave performances in 1903 and 1904 in Molesworth Hall. There they produced, among other pieces, Yeats's 'The Hour Glass,' 'The King's Threshold,' and 'The Shadowy Waters,' Lady Gregory's 'Twenty-five,' Synge's 'In the Shadow of the Glen' and 'Riders to the Sea,' and Colum's 'Broken Soil.' A flying one-day visit of the company to the Royalty Theatre, London, in March 1904, on the invitation of the Irish Literary Society of that city, brought them under the notice of Miss A. E. F. Horniman, a lady deeply interested in things theatrical. Forcibly struck by the acting of those amateurs and its possibilities, she purchased the Mechanics' Institute in Abbey street, Dublin, remodeled it into that building which afterward became famous under the name of the Abbey Theatre, endowed the company with an annual subsidy, leased the theatre to them free of rent for six years, and thus gave it a favorable and propitious start. The Abbey Theatre was formally opened on 27 Dec. 1904, with the first performance of Yeats's play 'On Baile's Strand.' In 1905 the name of the company was finally changed into The National Theatre Society, Limited. The players, to whom a large share of the credit of the success of the Abbey Theatre is due, had not received any salary until the intervention of Miss Horniman, but from that time onward they were regularly paid, so that they might be able to devote their whole time to their art. The Fays, whose acting in Yeats' and Synge's plays had been an artistic triumph, retired in 1908. In 1910, when Miss Horniman's subsidy ceased, the Abbey Theatre was purchased from her by public subscription, and was thenceforward thrown on its own resources, but managed to survive, and even, for a time, to make headway, despite occasional riots on the part of the audiences, and occasional threats from the authorities of Dublin Castle.

The soft, carefully trained, and beautifully modulated voices of the players, the use of the minimum amount of gesture, and the absence of elaborate scenery were all startling innovations, which thoroughly justified themselves. Many of the plays, too, were couched in the Hiberno-English idiom of the peasants, especially those of the west, and this, being a language full of life and reality, proved an added charm. The success of the Abbey players and their various predecessors gave a strong impetus to dramatic production, and dramatic societies sprang up all over the country, putting on home-made plays, to the output of which there seemed to be no end. There were the Ulster Literary Theatre at Belfast, the Cork Dramatic Society at Cork, the Theatre of Ireland and at least half a dozen similar societies at Dublin, and others at Galway and Waterford. In fact, practically every town of any size in Ireland had its own dramatic class, its own players, and its own playwrights. Many Gaelic societies produced plays in Irish by Douglas Hyde, Pierce Beasley, Thomas Haynes, Canon Peter O'Leary, and others, and at the *Oireachtas* held each year at Dublin prizes were offered for new plays. Under such conditions a plethora of playwrights arose. Many of them have, for convenience, been already treated in the course of this article, when their names occurred in some other connection; some few, who fall more strikingly under the category of novelists, will, for the same reason,

be dealt with later; the remainder, who may be regarded as dramatists more than anything else, will now be considered.

Edward Joseph Martyn (b. 1859) published in 1890, under the pseudonym of «Sirius,» a long satirical novel, 'Morgante the Lesser,' in which he displayed a strong imagination and great powers of caustic criticism of modern materialism and of various social tendencies. His psychological dramas, 'The Heather Field' and 'Maeve,' which no London theatrical manager would touch, were published in 1899. When produced by the Irish Literary Theatre in 1899 and 1900, respectively, each of them made an excellent impression. His satiric play, 'The Tale of a Town,' deemed not to be suitable for the Irish Literary Theatre, was made over by Moore into 'The Bending of the Bough,' which was staged in 1900. 'The Tale of a Town,' in its original form, was published with 'The Enchanted Sea,' a tragedy, in 1902. 'The Place Hunters,' a one-act satiric and farcical comedy, was published in 1902, and was followed, at a long interval, in 1907, by 'Romulus and Remus,' an extravaganza ridiculing the folk-play, by 'Grangecolman,' a tragedy, in 1912, by 'The Dream Physician,' another satirical comedy, in 1914, and by the 'Privilege of Place' in 1915. Martyn is to a certain extent a follower of Ibsen. He is not in favor of the peasant drama nor of the use of the Hiberno-English dialect as the medium of dramatic expression. Hence nearly all his characters are taken from the upper and the middle classes, and the language he employs is standard English. After three years of experiment he separated from Yeats because of a fundamental division of opinion as to the nature of the plays to be produced, but he never quite abandoned the underlying idea which animated him when he started on his theatrical career in Ireland. With the help of amateur organizations, such as The Players' Club, The National Players, and The Independent Theatre Company, he continued to produce in Dublin modern drama, including Scandinavian and Russian as well as Irish-made plays, until finally he saw his original conception once more carried out by the establishment of «The Irish Theatre» in 1915. What may ultimately develop into a formidable rival to the Abbey Theatre, with its tradition of peasant plays, was thus set up.

Lady Gregory was attracted to the theatre from the inception of the movement, and proved herself easily the most prolific of modern Irish playwrights. She also took an active part in the management of the Abbey Theatre. It is by her comedies, some of them bordering on farce, like 'Spreading the News,' 'The White Cockade,' 'The Canavans,' 'The Workhouse Ward,' and 'The Image,' that she is best known. 'Kincora' is a melodrama; 'The Gaol Gate' and 'Grania' are tragedies. 'The Kiltartan Molière' consists of versions, in peasant dialect, of 'Le Médecin malgré lui,' 'Les Fourberies de Scapin,' and 'L'Avare.' She was active in other directions as well. In 'Cuchulain of Muirthemne' (1902), 'Poets and Dreamers' (1903), 'Gods and Fighting men' (1904), and 'A Book of Saints and Wonders' (1906), she reproduced, in a vivified Hiberno-English form, some of the old legends and traditions of Ireland. She was not the first to employ that idiom — the credit for that belongs to Hyde — but she cultivated it assiduously, and in the use of the Kiltartan dialect, so called from the place of that name where she heard it spoken, she was highly successful.

Of all the dramatists of the Revival the name that stands out most prominently is that of John Middleton Synge (1871–1909). He owes his eminence, in the first place, to the undoubted merit of his dramas, and, in the second place, to the angry protests and discussions, and even the riots, which some of his works, notably 'The Playboy of the Western World,' provoked when produced in Ireland and in the United States of America. His first play was 'In the Shadow of the Glen,' a tragedy (1903), and it was followed by 'Riders to the Sea,' also a tragedy (1904), 'The Tinker's Wedding,' a farce, written 1902, published 1907 and acted 1909, 'The Well of the Saints,' a tragi-comedy (1905; performed in German at Berlin, 1906), 'The Playboy of the Western World,' a tragi-comedy (1907), and 'Deirdre of the Sorrows,' a tragedy, unfinished at his death and produced, in 1910, exactly as he had left it. The first two are in one act, the third in two acts, and the others in three acts. Of them all, 'Riders to the Sea' is perhaps the one that acts best. None of his plays have any moral or any didacticism. There is a wonderful charm in his diction: he gives it great attention, perhaps, as his prefaces tend to show, unduly exalted its importance, and the result is the Hiberno-English idiom *in excelsis*. In content, his plays are a revolt against the legendary, mystic, and lofty productions of Yeats, and are therefore highly realistic, and characterized, most of them, by an almost savage irony. That they represent the true life of rural Ireland may be legitimately doubted, but, nevertheless, they set the fashion of that peasant drama which ultimately became a distinctive feature of the Abbey Theatre. Synge also wrote 'Poems and Translations' (1909), some critical essays, and two volumes of travel-sketches, 'The Aran Islands' (1907) and 'In Wicklow, West Kerry, and Connemara' (1910).

Padraic McCormac Colum (b. 1881) is in the main a realist and an exponent of the peasant drama. He was a member of the original company of the Fays, for whom he wrote a playlet, 'The Children of Lir.' His plays are 'The Saxon Shillin'' (1902, performed 1903), 'The Kingdom of the Young' (1902), 'The Foleys,' 'Eoghan's Wife,' 'Broken Soil' (1903, afterward rewritten as 'The Fiddler's House,' 1907), 'The Miracle of the Corn' (1904), 'The Land,' an agrarian comedy (1905), 'Thomas Muskerry' (1910), 'The Destruction of the Hostel' (1910), 'The Desert' (1912, otherwise known as 'Mogu, the Wanderer'), and 'The Betrayal' (1913). In all his plays he purposely stresses situation rather than character or atmosphere. His volume of verse, 'Wild Earth' (1907), though it contains but 25 pieces, secured at once a great reputation. His 'Studies' (1907) contains two short stories and a reprint of 'The Miracle of the Corn,' the one play in which he displays the cult of symbolism. He also wrote 'My Irish Year' (1912), a volume of impressions, 'A Boy in Eirinn' (1913), another prose pres-

entation of Irish life and character, and 'The King of Ireland's Son' (1916). William Boyle (b. 1853) in his four plays, 'The Building Fund' (1905), 'The Eloquent Dempsey' (1906), 'The Mineral Workers' (1907), and 'Family Failing' (1912) deals with Irish country life. They are all in humorous vein. Both 'The Building Fund' and 'The Eloquent Dempsey' proved very popular. He also wrote 'A Kish of Brogues' (1899), a volume of racy Irish stories and poems. W. F. Casey is the author of two well-hiked plays, 'The Man who Missed the Tide' and 'The Suburban Groove.' Thomas C. Murray (b. 1873), a schoolmaster in County Cork, places the scene of his two grim tragedies, 'Birthright' (1910) and 'Maurice Harte' (1912), in that county. They are well constructed, and show an understanding of the class of people with whom he deals. He is also the author of 'The Wheel of Fortune' (1909) and of a quantity of magazine verse. "F. Norreys Connell" is the *nom de guerre* of Conal Holmes O'Connell O'Riordan (b. 1874), who succeeded Synge as a director of the Abbey Theatre in 1909. He is the author of 'The Piper' (1908), a short and clever play, containing a mordant and scarcely veiled satire on present-day Irish political life, which, like 'The Playboy,' provoked a riot when first produced. He also wrote a morality play, 'Time' (1909). His 'Shakespeare's End' (1912) is a play in verse, and 'Rope Enough' (1914) is a social comedy. O'Riordan is a well-known litterateur, and wrote not only verses but also several much discussed novels, such as 'In the Green Park' (1894), 'The House of the Strange Woman' (1895), and 'The Fool and his Heart' (1896). Seumas O'Kelly wrote two strong dramas of a tragic cast, 'The Shuiler's Child' (1909) and 'The Bribe' (1914), as well as 'The Matchmakers' (1907), 'The Flame on the Hearth' (1908), 'The Stranger' (1912), and 'The Homecoming' (1912), and also a novel, 'The Lady of Deerpark' (1917). Seumas O'Brien produced a side-splitting farce in 'Duty.' R. J. Ray is the author of 'The White Feather' (1909), 'The Casting out of Martin Whelan' (1910), and 'The Gombeen Man' (1913). George Fitzmaurice wrote a tragedy, 'The Moonlighter' (1914), and four comedies, 'The Country Dressmaker' (1907), 'The Piedish' (1908), 'The Magic Glasses,' and 'The Dandy Dolls,' all published as 'Five Plays' in 1914. They deal with life in County Kerry. 'The Country Dressmaker,' in particular, won great praise. St. John Greer Ervine, manager of the Abbey Theatre, a native of Belfast, wrote 'Mixed Marriage' (1911), a tragedy in which the religious intolerance among the artisans of the north is finely portrayed. 'The Orangeman' (1914) is a slighter study of a somewhat similar theme. 'The Magnanimous Lover' (1912) is a highly effective one-act play, which, however, was the occasion of a "Playboy" riot when first produced, because it was supposedly a reflection on Irish morality. 'The Critics' (1913) is a skit in dialogue on the reviewers who found 'The Magnanimous Lover' immoral. In 'Jane Clegg' (1914) the scene is laid in England. This is a well-constructed play, with a good plot, excellent characterization, and natural and forceful situations. 'John Ferguson' (1915), a powerful tragedy, has its scene laid in County Down. Besides these six plays, Ervine is the author of three highly successful novels, 'Mrs. Martin's Man' (1915), 'Alice and a Family' (1915), and 'Changing Winds' (1917), and of a volume of miscellaneous sketches entitled 'Eight O'Clock and Other Studies' (1915). The plays of S. Lennox Robinson deal with the southwest. They are 'The Clancy Name' (1908), 'The Cross Roads' (1909), 'Harvest' (1910), 'Patriots' (1912), and 'The Dreamers' (1915). They are all naturalistic and of a gloomy and tragic cast, and some of them are highly critical of conditions in Ireland. He also wrote a novel, 'A Young Man from the South' (1917). Edward John Moreton Drax Plunkett, eighteenth Baron Dunsany (b. 1878), displayed wonderful powers of imagination and created a new theogony in 'The Gods of Pegana' (1905) and its sequel, 'Time and the Gods' (1906). Other stories followed: 'The Sword of Welleran' (1908), 'A Dreamer's Tales' (1910), 'The Book of Wonder' (1912), 'Fifty-one Tales' (1915), and 'Tales of Wonder' (1916). In the meantime, he was also writing plays. His first volume, in this order, entitled 'Five Plays,' containing 'The Gods of the Mountain,' 'King Argimenes and the Unknown Warrior,' 'The Glittering Gate,' 'The Golden Doom,' and 'The Lost Silk Hat,' appeared in 1914. His second, 'Plays of Gods and Men,' contained 'The Laughter of the Gods,' 'The Queen's Enemies,' 'A Night at an Inn,' and 'The Tents of the Arabs.' All these plays are in prose. 'The Glittering Gate' and 'King Argimenes and the Unknown Warrior' were staged at the Abbey Theatre, the former in 1909 and the latter in 1911. 'A Night at an Inn' was presented for the first time at the Neighborhood Playhouse, New York, on 22 April 1916. His plays are all distinguished for their irony, and some of them are highly humorous. In fact, 'The Glittering Gate' and 'The Lost Silk Hat' are farces. Lord Dunsany's style has a beautiful cadence and swing.

The Ulster Literary Theatre was started in 1902 and was formally inaugurated in December, 1904. Its organ was *Uladh*, which ran for four quarterly numbers. The first plays performed were 'The Reformers,' a satire on municipal politics, by Lewis Purcell, and 'Brian of Banba,' a heroic drama, by Bulmer Hobson. In 1905, 'The Little Cowherd of Slainge,' by Joseph Campbell, and 'The Enthusiast,' by Lewis Purcell, were staged. The next year, 1906, saw the presentation not only of Lewis Purcell's amusing comedy, 'The Pagan,' but also of 'The Turn of the Road,' the first play of the greatest of the northern dramatists, Rutherford Mayne, all of whose important work was associated, in the first instance, with the Ulster Literary Theatre. "Rutherford Mayne" (S. Waddell), an actor by profession, wrote four plays, collected under the title of 'The Drone and other Plays' (1912). The first, as we have just seen, was 'The Turn of the Road,' a faithful portraiture of life in the country districts of Ulster. The second, produced in 1908, was 'The Drone,' a sardonically humorous comedy in two acts, but later extended into three. 'The Troth,' produced in 1908, and 'Red Turf,' the setting of which is in Galway, produced in 1911, are tragedies in one act. "Mayne" afterward wrote 'If!' (1915), a farcical comedy in three acts. He is also

author of 'The Gomeril' (1909) and of a tragedy of middle class life, entitled 'The Captain of the Hosts.' He is rather deficient in plot, but he is very successful in characterization, and his diction is generally beautiful.

The novel, the short-story, and the essay are not quite so fully represented in the Revival as poetry and the drama, but, none the less, all three forms were fairly extensively cultivated, as part of what has been already written in this article shows. Something more under those headings remains now to be noted.

George Moore (b. 1852), though born in Mayo, does not belong by any means exclusively to Ireland: rather is he cosmopolitan. Yet, had it not been for his interest in the literary movement in his native land, he would not have paid an 11 years' visit to Dublin, and we should probably be without 'Evelyn Innes' (1898), and certainly without its sequel, 'Sister Teresa' (1901), as well as 'The Untilled Field' (1903), 'The Lake' (1905), and the three volumes, 'Ave' (1911), 'Salve' (1912), and 'Vale' (1914) which make up the indiscreet but fascinating book known as 'Hail and Farewell.' In earlier life, he had written poems and criticism, as well as novels so frankly naturalistic as to make the judicious shiver. After his departure from Dublin, he wrote 'The Brook Kerith' (1916), a novel dealing with the supposed later life of Jesus and presenting a revolutionary interpretation of the founder of Christianity. Moore's plays, in addition to those written in collaboration, are 'The Strike at Arlingford' (1893); 'The Apostle' (1911), a scenario on which is based 'The Brook Kerith'; a dramatized version of his own novel, 'Esther Waters' (1912); and 'Elizabeth Cooper' (1913). A scorner of convention, an exponent of realism raised to the *nth* power, a wayward, many-sided, interesting genius is George Moore. Hon. Emily Lawless (1845–1913), daughter of the third Lord Cloncurry, achieved a certain amount of notoriety with 'Hurrish' (1886), a story of the Land League. She also wrote historical novels, 'With Essex in Ireland' (1890) and 'Maelcho' (1894), dealing, respectively, with the rising of Hugh O'Neill and the Desmond rebellion. 'Grania' (1892) treats of life on the Aran islands. 'Traits and Confidences' (1898) and 'The Book of Gilly' (1906) are two volumes of sketches and impressions of the west. Her poetry, remarkable alike for narrative strength and lyric beauty, is contained in 'With the Wild Geese' (1902), 'The Point of View' (1909), and the posthumously published 'The Inalienable Heritage' (1914). E. Œ. Somerville and "Martin Ross" (Miss Violet Martin) collaborated in the very amusing 'Experiences of an Irish R. M.,' as well as in 'The Real Charlotte,' 'All on the Irish Shore,' and 'Dan Russell the Fox.' 'Irish Fairy Tales' (1890), by Edmund Leamy (1848–1904), was very favorably received. After his death, a volume of his stories, 'By Barrow River, etc.,' was published. William Patrick Ryan (b. 1867), journalist and critic, wrote several novels, the best known of which is perhaps 'The Heart of Tipperary.' Katharine Tynan Hinkson produced a great many popular novels, such as 'The Handsome Brandons' and 'Judy's Lovers,' but her fame will not depend so much on them as on her poetry. Her husband, Henry A. Hinkson, has to his credit a few well-known novels, mostly semi-historical, like 'Up for the Green' and 'The King's Deputy.' Shan F. Bullock is a serious novelist, a realist, dealing in the main with the petty country gentry, the small farmers, and the peasants of the Orange counties of the north. Of some dozen works, 'The Awkward Squads' (1893), 'The Red Leaguers' (1904), and 'Thomas Andrews' (1912), may be selected as typical. 'Ring O'Rushes' (1896) and 'Irish Pastorals' (1901) consist of short-stories or sketches. William Buckley also deals in a realistic way with life in Ulster. His novels are 'Croppies Lie Down' (1903) and 'Cambia Carty' (1907). Seumas MacManus (b. 1870) wrote some verse, but he gained greater celebrity as a lecturer and story-teller than as a poet. Among many books of his, 'Through the Turf Smoke' (1899) and 'Yourself and the Neighbors' (1914) may be particularized. Jane Barlow began her career as a poet with 'Bogland Studies' (1892) and she afterward wrote other books of verse, but it is as the author of short-stories and sketches illustrative of certain phases and aspects of peasant life in Ireland that she built up her undoubtedly high reputation. Her publications in this class, beginning with 'Irish Idylls' in 1892 and continued to the present date (1918), are alarmingly numerous. Among them may be named 'Kerrigan's Quality' (1893), 'Strangers at Lisconnell' (1895), and 'In Mio's Youth' (1917). James Stephens (b. 1882) rose suddenly into fame as a great novelist in 1912, but he had already made his reputation as a poet. His poetical works are 'Insurrections' (1909), 'The Hill of Vision' (1912), 'Songs from the Clay' (1915), 'The Rocky Road to Dublin' (1916), 'Green Branches' (1917), and 'Reincarnations' (1918). His novels, which rank in a high class, are 'The Charwoman's Daughter' otherwise known as 'Mary, Mary' (1912), 'The Crock of Gold' (1912), 'Here are Ladies' (1913), 'The Demi-Gods' (1914), and 'The Adventures of Seumas Beg' (1915). His book, 'The Insurrection in Dublin' (1916), is an account by an eye-witness of the Easter week rising in that year. Patrick MacGill (b. 1891) also won fame in the first instance as a writer of verse with 'Gleanings from a Navvy's Scrap-Book' (1911), from which came his sobriquet of "the navvy poet." Others of his verses are 'Songs from the Dead End' (1912) and 'Soldier Songs' (1916). He wrote two starkly realistic and much talked-of novels, 'Children of the Dead End' (1914) and its sequel, 'The Rat Pit' (1915). 'The Brown Brethren' (1916) is one of his books concerning the war. It deals with the doings of a section of the London Rifles at the front in France. Other novelists and novels are Purdon, K. F., 'The Folk of Furry Farm' (1914); Joyce, James, 'Dubliners' (1914), and 'A Portrait of the Artist as a Young Man' (1917); also a play, 'Exiles' (1918); "Dermot O'Byrne" (Arnold Bax), 'Children of the Hills,' realistic short stories (1913); also author of 'Seafoam and Firelight,' poems (1910), and 'The Sisters and Green Magic' (1911); Lepper, John Heron, 'A Tory in Arms' (1916) and 'The North East Corner' (1917); Doyle, Lynn, 'Mr. Wildridge of the Bank' (1916); Butler, Mary Lambert (Mrs. Thomas O'Nolan), 'The Ring of Day.' Two

volumes of beautiful stories for children are 'Celtic Wonder Tales' (1910), by Ella Young, and 'Heroes of the Dawn' (1913), by Violet Russell. Besides his 'History of Ireland' (1878–1880), Standish O'Grady in later life wrote a number of historical romances, dealing with various epochs in his country's chequered story. Some of these are 'Red Hugh's Captivity' (1889), 'Finn and his Companions' (1892), 'The Bog of Stars' (1893), 'The Coming of Cuculain' (1894), 'In the Wake of King James' (1896), 'The Flight of the Eagle' (1897), 'In the Gates of the North' (1901). So politically unclassifiable as to be dubbed with the paradoxical titles of "Radical Aristocrat" and "Fenian Unionist," O'Grady yet took his own part in Irish politics with his essays, 'The Crisis in Ireland' (1882), 'Toryism and the Tory Democracy' (1886), and 'All Ireland' (1898), in all of which he uses a vigorous and beautiful prose far transcending that usually associated with political disputation. He collaborated in 'Ideals in Ireland' (1901). In 1900 he founded *The All Ireland Review*, and carried it on for six years. He had other journalistic activities, his latest being in connection with *The New Age* and its advocacy of National Guilds and the abolition of the wage-system. A special word must here be said of Eleanor Hull's work, 'The Cuchullin Saga in Irish Literature' (1898). The history of the hero is set out in 14 stories of a fine literary type, while the introduction and notes, as well as the careful collating of texts, give it a distinctly scholarly character. In this respect, it is in marked contrast with Lady Gregory's 'Cuchulain of Muirthemne.' The whole story of the epic, 'The Cattle Spoil of Cooley,' in which Cuchulain figures so prominently, was done into English prose from the most ancient manuscripts for the first time in 1913 by Joseph Dunn.

Because an essayist is generally something more than that, most of the essayists of the Revival have been already treated under other headings. There are, however, a few who deserve separate mention. Very Rev. Canon Patrick A. Sheehan (1852–1913) wrote three very remarkable books of essays, 'Under the Cedars and the Stars,' 'Parerga,' and 'The Intellectuals.' Thomas Michael Kettle (1880–1916) joined the British army in 1914 soon after the outbreak of the great war, and became a second lieutenant in the Dublin Fusiliers. He died from wounds received at Ginchy on 8 Sept. 1916, during the Somme advance. He translated 'Contemporary Ireland' (1908) from the French of L. Paul-Dubois. He also published a volume of essays, 'The Day's Burden' (1910), dealing with politics, literature, and economics, and two booklets, 'Home Rule Finance' (1911) and 'The Open Secret of Ireland' (1912). 'Criticism and Courage,' by Frederick Ryan, author of 'The Laying of the Foundations,' contains some remarkable views, vigorously expressed. Sir Horace Plunkett's 'Ireland in the New Century' (1904) drew forth many angry protests, especially from Irish priests. None of these were abler than Right Rev. Monsignor Michael O'Riordan's 'Catholicity and Progress in Ireland' (1905). Here mention should also be made of 'The Glories of Ireland' (1914), a series of essays by some of the leading writers of the Revival and other scholars and litterateurs, setting forth in a unique way and in a manner never before attempted the various activities of the Irish race during 2,000 years. The most distinctive essayist of the Revival is perhaps "John Eglinton" (W. K. Magee). He is known to and appreciated by the elect, but he is assuredly rather caviare to the general. He was described by Moore in 'Ave' as "a sort of lonely thorn-tree," and in his attitude toward some of the manifestations of the Revival he was as the voice of one crying in the wilderness. Sceptical and ironically detached, he was apparently out of touch with the movement of which, nevertheless, he was an important component part. The distinction he draws between the Modern Irishman (that is, the Anglo-Irishman) and the Mere Irishman, his allusion to Brian Boroimhe, an incontestably great historic figure, as a shadowy person, his flippant and patronising attitude toward what he calls "the grand old tongue," and his denial that the Island of Saints ever produced a saint, by which term he understands a religious genius, would certainly tend to jar the sensibilities of the great majority of his fellow-countrymen, and cause one to doubt whether. "John Eglinton" is exactly the man to accomplish the task he proposes, namely, "to introduce new and unassailable ideals of nationality, to sink the wells of thought beneath the barren surface of tradition, and to bring Ireland into political and spiritual unity." He has, however, much to say that Irishmen may find it useful to ponder. His style is beautiful: in the words of Yeats, it is full of "orchestral harmonies." His matter is not so much literary or social — although it is something of both — as it is philosophical. Both for style and matter he makes delightful reading, even for those who may not agree with his tenets. He wrote poems, some of which, of considerable merit, are to be found in 'The Book of Irish Verse' (1895), but he did not attempt either the novel or the drama, and it is as an essayist that he will go down to posterity. His books are 'Two Essays on the Remnant' (1896), 'Pebbles from a Brook' (1901), 'Some Essays and Passages' (1905, edited by Yeats), 'Bards and Saints' (1906), 'Anglo-Irish Essays' (1917). He also edited the review *Dana* during its brief existence from March 1904 to April 1905, and contributed to 'Literary Ideals in Ireland' (1899), there taking his stand, as he does elsewhere also, in favor of cosmopolitanism as against nationalism in literature. He has been called "an Irish Emerson," and from many points of view the appellation is an apt one. Stephen Lucius Gwynn (b. 1864), distinguished as poet, novelist, and critic, was elected member of Parliament for Galway in 1906. During the war he joined the British army as a commissioned officer. Two volumes of his verse are 'The Queen's Chronicler and other Poems' (1901) and 'A Lay of Ossian and Saint Patrick' (1903). He collaborated with Thomas M. Kettle in producing 'Songs of the Irish Brigade.' One of his noted novels is 'The Old Knowledge.' 'To-day and To-morrow in Ireland' (1903) is a collection of his essays on Irish subjects. He wrote the monograph on Thomas Moore in the 'English Men of Letters' series, as well as 'Highways and Byways in Donegal and Antrim,' 'The Decay of Sensibility and other Essays,' 'Tennyson: a

Critical Study,' 'Memorials of an Eighteenth Century Portrait Painter,' 'The Repentance of a Private Secretary,' and 'Robert Emmet.'

Ever since John Mitchel by his 'Jail Journal' popularized that form of writing, there have not been wanting imitators (*teste*, for example, Michael Davitt), and what may be called *In Vinculis* literature has its recognized place in the history of Ireland. Recent events have stimulated productivity of this type. We have, among other books, 'With the Irish in Frongoch' (1917), by W. J. Brennan Whitmore, Frongoch being the Welsh hamlet where some 1,800 Sinn Fein prisoners were confined after the rising of 1916; 'Memories of Mountjoy' (1917), by Sean Milroy, Mountjoy being the name of a Dublin prison which has had an unenviable notoriety thrust upon it; and 'A Chronicle of Jails' (1917), by Darrell Figgis, full of hiatuses caused by the deletions of the censor, but nevertheless brimful of experiences, because the author suffered three political imprisonments in rapid succession in the short space of two years.

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IRISH LITERARY SOCIETY, an organization established in 1892, in London. Its object is to promote the study of Irish literature, music, art and history. Some of the leading Irish literary men and women of England and Ireland are active or honorary members, and strive in many ways to promote the work of the society. The society provides lecture courses on topics pertaining to literary Ireland, and it has a large library which may be used by any of its members.

IRISH LITERATURE IN ENGLISH. The beginning of Anglo-Irish literature can be traced to at least the 14th century. Michael of Kildare (Michael FitzBernard), a mendicant friar, wrote a collection of poems in Latin and English or Anglo-Norman, and, as one of them has reference to the building of the walls of Ross in 1265, a late date in the 13th century, or an early one in the 14th, may reasonably be assigned to him. Friar Clyn, who died at Kilkenny in 1349, wrote 'Annals,' which are useful for the happenings of the 25 years preceding that date. 'The Pride of Life,' a morality play, one of the earliest of its class in the English language, was written in 1345, and there is ample evidence that mystery and morality plays were performed at Dublin and Kilkenny at different times in the 14th century. About 1390 Lionel Power wrote the first treatise on music in English. Some annals belong to the 15th century. Bishop Bale of Ossory wrote and produced at Kilkenny in 1552 a tragedy and a comedy. Father William Good, an English Jesuit located at Limerick, wrote in 1566, at the request of Camden the antiquarian, a 'Description of the Manners and Customs of the Wild Irish.' A little later, Richard Stanihurst (1547–1618), who was born at Dublin, wrote for Holinshed's 'Chronicles,' published in 1577, a 'Description,' and part of a 'History' of Ireland. In 1582 Stanihurst translated four books of 'Virgil his Aeneis' into quantitative hexameters on the false prosodic model which Gabriel Harvey and his friends were at that time trying to introduce into English versification. James Usher (1581–1656) a nephew of Stanihurst, was, in intellect and scholarship, one of the greatest men that Ireland ever produced. He was "learned to a miracle" (Selden), the "great luminary of the Irish church" (Johnson), "not unworthy to rank with Duns Scotus" (D'Alton). One of the earliest students of Trinity College, Dublin, he became bishop of Meath, and was afterwards promoted to be archbishop of Armagh and primate of Ireland. His *magnum opus* is the 'Annales Veteris et Novi Testamenti,' written, like most of his books, in Latin. His works in English are mostly on theological or controversial subjects. Thomas Campion (1567–1620) is also said to have been born in Dublin. A versatile genius — lawyer, physician, composer of music, and litterateur — he wrote four masques and some really excellent lyrics. Sir John Denham (1615–69), another Dubliner by birth, is still remembered for his poem, 'Cooper's Hill,' in which occurs the celebrated apostrophe to the river Thames. Wentworth Dillon, Earl of Roscommon (1633–84), wrote many translations and occasional verses. His best known work is his poetical 'Essay on Translated Verse.' Son of the "great" Earl of Cork, Hon. Robert Boyle (1627–91), one of the most famous experimental philosophers of his age and one of the founders of the Royal Society, was born at Lismore, County Waterford. His writings are voluminous, but are mostly of a technical character. His 'Occasional Reflections on Several Subjects' supplied hints to the two great satirists, Butler and Swift. His brother,

Roger Boyle (1621–79), who became in turn Lord Broghill and Earl of Orrery, played an important part both in Irish and in English history. He was the author of six tragedies and two comedies, of a romance, 'Parthenissa,' and of a 'Treatise on the Art of War.' Charles Leslie (1650–1722), son of the bishop of Raphoe and Clogher, abandoned law for the ministry, and became a noted controversialist. Many years of his life were spent in disputes with Catholics, Quakers, Socinians, and Deists. His well-known work, 'A Short and Easy Method with the Deists,' had an immense vogue. William Molyneux (1656–98) was the only member of the Irish House of Commons to protest against the ratification of that act of the English Parliament (1698), which was meant to destroy the Irish woolen industry, and succeeded in its object. He followed up his protest by the publication of his 'Case of Ireland being bound by laws [made] in England Stated.' This book, which is now regarded as a classic on the constitutional relations between Ireland and England, was ordered by the English Parliament to be burned by the common hangman. It is noteworthy that Molyneux begins his argument by enunciating, in almost the same words, the principles which 78 years later were placed in the forefront of the American Declaration of Independence. John Toland (1670–1722), the Deist, born near Redcastle, County Derry, was the possessor of a pointed and vigorous style. He wrote many books, of which the most famous is 'Christianity not Mysterious.' This work started the deistical controversy, which plays so prominent a part in the English literature of the first half of the 18th century. The Irish Parliament ordered the hangman to burn it. Thomas Southerne (1660–1746), born at Oxmantown, near Dublin, gave up law for the drama and then entered the army, in which he rose to the rank of captain. His prospects of further advancement being cut off by the Revolution of 1688, he once more turned his attention to production for the stage. He has 11 plays to his credit. His comedies, while amusing, are, in accordance with the taste of the times, of the gross order. His tragedies, 'Isabella, or the Fatal Marriage,' and 'Oroonoko,' are powerful and pathetic. He was the first writer in the English language to denounce the slave trade. George Farquhar (1678–1707) was born at Derry. From being an actor, he became a playwright, and he has left us eight sparkling comedies, of which the last, 'The Beaux' Stratagem,' is the best. Nahum Tate (c. 1652–1715), born at Dublin, and Nicholas Brady (1659–1726), a native of Bandon, published in 1696 their joint metrical version of the Psalms, which in time took the place of the older translation by Sternhold and Hopkins. In 1692 Tate succeeded Shadwell as poet-laureate. He wrote most of the second part of 'Absalom and Achitophel,' with a very good imitation of Dryden's manner. Toward the end of his life Tate fell on evil days, and he died, a prisoner for debt, in the Mint. Brady wrote a tragedy and a 'History of the Goths and Vandals.' He also translated the 'Æneid' into blank verse.

In the 18th century the volume of Anglo-Irish literature is greatly increased. The first great names that strike us are those of Jonathan Swift, Sir Richard Steele, and George Berkeley (qq.v.). Thomas Parnell (1679–1718), member of a family which has played a prominent part in Irish affairs, was born in Dublin. Entering the Church he became archdeacon of Clogher and rector of Finglas. He contributed to the *Spectator* and *Guardian*, and was one of the original members of the famous Scriblerus Club. He wrote much verse. 'A Hymn to Contentment,' 'A Night-piece on Death,' and 'The Hermit' are the best remembered of his works. Francis Hutcheson (1694–1746), born in County Down, was elected a professor at the University of Glasgow in 1729. He occupies a leading place in the history of 18th century philosophy. His 'Inquiry into the Original of Our Ideas of Beauty and Virtue' and his 'Essay on the Nature and Conduct of the Passions' gave him a great name among his contemporaries, and his writings have exercised a profound influence on others coming after him, like Hume, Adam Smith, and Reid. Charles Macklin or MacLaughlin (c. 1700–97), born in County Westmeath, was an actor who remained on the boards for the extraordinary term of 70 years. He wrote a tragedy and many comedies and farces. His masterpiece is 'The Man of the World,' a farcical comedy, in which is introduced Sir Pertinax MacSycophant, one of the traditional burlesque characters of the English stage. Thomas Amory (c. 1691–1788), probably born in County Clare, is still remembered for his eccentric book, 'The Life of John Buncle, Esq.' Another of the bizarre figures of this period is Laurence Sterne, author of 'Tristram Shandy' and 'A Sentimental Journey.' Hugh Kelly (1739–77), born at Dublin, the son of a publican and himself at first a staymaker, had a varied career, being successively attorney's clerk, newspaper writer, dramatic critic, essayist, novelist, playwright, and barrister-at-law. His novel is 'Louisa Mildmay, or the History of a Magdalen.' His first comedy, 'False Delicacy,' which was a great success on the stage and a still greater one in book form, raised him from poverty to comparative wealth, and gave him a European reputation when translated into German, French, and Portuguese. His later comedies and a tragedy were failures, nor did he, on retiring from stage-work for the last three years of his life, achieve any great success at the bar. Charles Coffey (d. 1745) wrote several operettas and burlesque operas, the best known of which is 'The Devil to Pay, or the Wives Metamorphosed.' John Cunningham (1729–73) wrote a successful farce, 'Love in a Mist,' when he was only 17. He also wrote elegies and pastorals. Isaac Bickerstaffe (1732–1816), a name made famous by Swift and later by Steele, was born at Dublin, and was probably the son of a locksmith. He was a page to Lord Chesterfield and afterward an officer in the army. He produced between 1756 and 1805 a number of musical farces, comic operas, comedies, farces, and burlettas, and also an oratorio, 'Judith.' In his comic opera, 'Love in a Village,' occurs the well-known song, 'We all love a pretty girl — under the rose.' Henry Brooke (c. 1703–83) was born at Rantavan, County Cavan. He was a very voluminous writer of verse and prose. He is now best remembered for his celebrated novel, 'The Fool

of Quality.' His tragedy, 'Gustavus Vasa,' was barred from production in London, but was afterward put on the stage in Dublin as 'The Patriot.' His daughter, Charlotte Brooke (c. 1750–1803), was a pioneer of the Celtic Renaissance, for she endeavored to revive interest in the native literature of Ireland by the publication of her series of translations entitled 'The Reliques of Irish Poetry' (1789). She also published in 1795 at least one number of a Gaelic magazine, *Bolg Tsolair,* and a volume of Translations, 'Laoi na Sealge.' She wrote a tragedy, 'Belisarius,' and a novel, 'Emma, or the Foundling of the Wood.' Charles Johnstone (c. 1719–1800), a County Limerick man, was the author of several satirical romances, of which 'Chrysal, or the Adventures of a Guinea,' had the greatest reputation. Samuel Johnson read this work in manuscript and advised its publication, and Sir Walter Scott a few years later said that the author of 'Chrysal' deserved to rank as a prose Juvenal. Johnstone also wrote a picaresque novel, 'The History of John Juniper, Esq., alias Juniper Jack.' Arthur Murphy (1727–1805), born at Clooniquin, County Roscommon, was biographer, translator, poet, and playwright. Educated at Saint Omer, he became in turn a clerk, a journalist, an actor, and a barrister. Among his tragedies are 'The Orphan of China,' 'The Grecian Daughter,' and 'Arminius.' His comedies and farces, such as 'The Apprentice,' 'The Upholsterer,' 'The Way to Keep Him,' and 'All in the Wrong,' are excellent. He was appointed in 1798 a commissioner of bankruptcy. Oliver Goldsmith, who in Johnson's well-known phrase, tried nearly every kind of writing and touched none that he did not adorn, Edmund Burke, great orator and political philosopher, and Richard Brinsley Sheridan (qq.v.), eloquent speaker and famous playwright, hold, each of them, a pre-eminent rank among the Irish writers of English. Rev. Philip Francis (c. 1708–73) made something of a name as a translator of Horace and Demosthenes and as an author of tragedies. His son, Sir Philip Francis (1740–1818), is the reputed author of the sensational 'Letters of Junius,' which appeared in the *Public Advertiser* between 21 Jan. 1769 and 21 Jan. 1772. William Drennan (1754–1820), born in Belfast and son of a Presbyterian clergyman, took an active part in founding the organization of the United Irishmen, and was prosecuted for sedition, but escaped punishment. His stirring lyrics were extremely popular and had a widespread effect. His 'Erin' was considered by Moore to be one of the most perfect of modern songs. This is the piece that first gave to Ireland the title of the Emerald Isle. Mary Tighe (1772–1810), daughter of Rev. William Blachford, was born in Dublin. Her 'Psyche, or the Legend of Love,' an adaptation of the story of Cupid and Psyche from the 'Golden Ass' of Apuleius, is written in the Spenserian stanza, which she handled with great freedom and ease. This and her other poems won her a considerable reputation. Moore paid her a delicate compliment in 'Tell me the witching tale again,' and Mrs. Hemans bewailed her untimely death in 'The Grave of a Poetess.' John O'Keeffe (1747–1833), the most prolific of Irish dramatists, was born in Dublin. He wrote comedies, musical pieces, comic operas, pantomimes, interludes, burlettas, pastoral dramas, and poems. His comedy, 'Wild Oats,' had something enduring in it, for, after more than 100 years, it still keeps the stage. Some of his songs, like 'I am a Friar of Orders Grey' and 'The Ploughboy,' are famous. O'Keeffe was meant to be a painter, but gave up that profession in order to become an actor, and then developed into a playwright. For many years of his long life he was totally blind. In 1826 he was given a pension of 100 guineas a year from the king's purse. Among the great Irish orators of the end of the century were Henry Flood (1732–91), Henry Grattan (1746–1820), and John Philpot Curran (1750–1817). Andrew Cherry (1762–1812), born at Limerick, became an actor and afterward an actor-manager. He wrote some comedies, of which the best-known is perhaps 'The Soldier's Daughter.' His songs, 'The Green Little Shamrock of Ireland,' 'The Bay of Biscay,' and 'Tom Moody, the Whipper-in,' bid fair to be immortal.

Other famous song-writers and songs, of different periods, are Thomas Duffett (fl. 1676), author of 'Come, all you pale lovers'; Arthur Dawson (c. 1695–1775), 'Bumpers, Squire Jones,' one of the best Bacchanalian ditties in the language; George Ogle (1742–1814), 'Molly Asthore' and 'The Banks of Banna'; Richard Alfred Milliken (1767–1815), the grotesque 'Groves of Blarney'; Edward Lysaght (1763–1809), 'Our Ireland' and 'Kate of Garnavilla'; Henry Brereton Code (d. c. 1830), 'The Sprig of Shillelagh'; Charles O'Flaherty (1794–1828), 'The Humour of Donnybrook Fair'; George Nugent Reynolds (c. 1770–1802), 'Kathleen O'More'; James Orr (1770–1816), 'The Irishman'; Rev. Charles Wolfe (1791–1823), 'If I had thought thou couldst have died' and 'The Burial of Sir John Moore'; Rev. Luke Aylmer Connolly (d. c. 1833), 'By Rathlin's Isle I Chanced to sail'; Louisa Crawford (c. 1790–1858), 'Kathleen Mavourneen' and 'Dermot Astore'; James Tighe (1795–1869), 'He sleeps in the vale, near the brook and the willow'; John Augustine Wade (1796–1845), 'Meet me by moonlight alone' and 'I've wandered in dreams'; Garret Wellesley, Earl of Mornington (1735–81), 'Here in cool grot' and 'Come, fairest nymph'; Leonard McNally (1752–1820), 'The Lass of Richmond Hill'; Samuel Lover (1797–1868), 'Barney O'Hea,' 'The Low-backed car,' and 'I'm not myself at all'; Thomas Quinton (1797–1860), 'Fill a cup'; Joseph O'Leary (c. 1801 — c. 1845), 'Whisky, drink divine'; Rev. Francis Sylvester Mahony (1804–66), 'The Bells of Shandon'; Richard Sheil (c. 1800–60), 'Bellewstown Hill'; John Toleken (d. c. 1865) and Henry Bennett (c. 1766–1828), 'Saint Patrick was a gentleman'; Edmund O'Rourke (1813–1879), 'Killarney'; John O'Connell (d. c. 1860), 'When this old hat was new'; Rev. Thomas Hamblin Porter (fl. 1830), 'The Night-cap'; "Valentine Vousden" (c. 1820 — c. 1900), 'The Irish Jaunting Car'; Michael Doheny (1805–63), 'Acushla Gal Machree'; Sir Stephen De Vere (1812–1904), 'The Snowy-breasted Pearl'; Michael Joseph McCann (c. 1824–83) 'O'Donnell Abu'; James Lynam Molloy (1837–1907), 'The Kerry Dance,' 'Just a song at twilight,' and 'Bantry Bay'; William Gorman Mills (1828–

91), 'I'll sing thee songs of Araby'; Captain John Wood (d. c. 1870), 'Cork is the Eden for you, love, and me'; William B. McBurney (c. 1844—c. 1892), 'The Croppy Boy'; J. P. Trainor (d. 1910), 'The Cruise of the Calabar'; John Kells Ingram (1823–1907), 'Who fears to speak of '98?'; Robert Jasper Martin (1846–1905), 'Killaloe'; Timothy D. Sullivan (1827–1917), 'God Save Ireland'; Alfred Perceval Graves (b. 1846), 'Father O'Flynn'; Michael Scanlan (b. 1836), 'The Jackets Green' and 'The Fenian Men'; William Boyle (b. 1853), 'Molly Dooley'; and Francis Arthur Fahy (b. 1854), 'The Ould Plaid Shawl' and 'The Irish Lullaby.'

The spread of education and the increasing use of the English language instead of the Irish in the 19th century produced a correspondingly increased output of literature, to which, in addition, a wonderful impetus was given by the great political events, like the movements for Catholic Emancipation in the 20's and for Repeal of the Union in the 40's, the risings of '48 and '67, and the Home Rule and Land League agitations of the 70's, 80's and 90's. The establishment of the *Nation* newspaper in 1842 was another potent factor in stimulating Irish writers of English. Toward the end of the 19th and the beginning of the 20th century, the influence of the Celtic Renaissance made itself perceptibly felt in Ireland, resulting in the foundation of the Gaelic League and of various literary societies, in the establishment of the Sinn Fein and Irish-Ireland parties, and in the start of the Irish literary revival, all of which tended to promote a marked activity in Anglo-Irish literature.

The novel-writers of the earlier part of this period may be said to be headed by Maria Edgeworth (1767–1849), who, although born in England, is, from family connections, long residence in Ireland, and the tone and temper of her principal works, usually classed among Irish authors. She wrote 'Moral Tales,' 'Popular Tales,' 'Tales of Fashionable Life,' 'Belinda,' and many more, but she is now principally remembered for her works dealing with Irish life and conditions, especially 'Castle Rackrent' and 'The Absentee.' Even these have rather gone out of fashion, but they were a revelation at the time of their production. They impressed Sir Walter Scott so much that he decided to try to do for Scotland what she had done for Ireland, and at a later period they inspired Turgenev to do similarly for Russia. Elizabeth Hamilton (1758–1816), born at Belfast, wrote songs and poems and various novels, of which latter 'The Cottagers of Glenburnie' was the most popular. The memory of Regina Maria Roche (c. 1764–1845), born at Waterford, is still kept alive by 'The Children of the Abbey.' The Rev. William Hamilton Maxwell (1794–1850), born at Newry, originator of the novel of military life, wrote exciting and popular stories like 'Wild Sports of the West,' 'Hector O'Halloran,' 'Captain Blake,' and 'Stories of Waterloo.' The Rev. Charles Robert Maturin (1782–1824), born at Dublin, was the author of several stories, the most famous being 'Melmoth the Wanderer' and 'The Albigenses.' He also wrote three tragedies, 'Bertram, or the Castle of Saint Aldobrand,' 'Manuel,' and 'Fredolfo.' Michael James Whitty (1795–1873), born at Wexford, wrote 'Tales of Irish Life,' a very successful book, which was translated into French and German. His son, Edward Michael Whitty (1827–60) was author of the remarkable novel, 'Friends in Bohemia.' Matthew Archdeacon (c. 1800–1853 or 1862), born at Castlebar, County Mayo, wrote 'Legends of Connaught,' 'Connaught in 1798,' 'The Priest Hunter,' and 'Everard.' William Carleton (q.v.) occupied the centre of the Irish literary stage for the long period from 1830 to his death in 1869. Great, however, as were his claims on the reading public, there were others who pressed him close. Gerald Griffin (1803–40), born at Limerick, went to London to seek his fortune, retired from the world when he had begun to attain success, and died as a Christian Brother in his 37th year. His powerful story, 'The Collegians,' afterward dramatized by the Dublin-born Dion Boucicault (1822–90) as 'The Colleen Bawn,' and later turned into an opera as 'The Lily of Killarney,' is by some critics claimed to be the greatest Irish novel. Other stories by Griffin are 'Holland-tide Tales,' 'Tales of the Munster Festivals,' and 'The Invasion.' He also wrote a tragedy, 'Gisippus,' and some beautiful short poems. John Banim (1798–1842) and his brother, Michael Banim (1796–1874), wrote jointly 'Tales of the O'Hara Family,' and, besides, each wrote several novels separately. John Banim's best stories are perhaps 'The Boyne Water' and 'The Nowlans'; Michael's, 'Crohoore of the Billhook' and 'The Croppy.' Furthermore, John Banim wrote several tragedies and essays and a long and elaborate poem, 'The Celt's Paradise.' His lyric, 'Soggarth Aroon,' is celebrated. Samuel Lover (1797–1868), born in Dublin, was a versatile genius — novelist, poet, painter, musical composer, editor, and public entertainer. His novels, 'Handy Andy' and 'Rory O'More,' are well constructed and sparkle with wit and humor. He wrote about 300 songs, including those already named, and composed the music for most of them. Besides, he wrote a burletta, 'Il Paddy Whack in Italia,' and an extravaganza, 'The Happy Man,' as well as several comic dramas and metrical tales. Charles James Lever (1806–72), born at Dublin, was one of the most popular and prolific, as well as one of the most humorous, of Irish novelists. Scattered here and there through his books are numbers of rollicking songs. 'Harry Lorrequer,' 'Charles O'Malley,' and 'Tom Burke of Ours,' to name only three out of a large total, may be taken as among his typical novels. Lady Morgan (c. 1778–1859), daughter of Robert Owenson or MacOwen, wrote many novels, such as 'The 'Wild Irish Girl, 'O'Donnell,' and 'Florence McCarthy,' besides a comic opera, books of travel and many poems. Capt. Thomas Mayne Reid (1819–83), born at Crosskilt, County Down, emigrated to America in 1838, served as a captain in the Mexican War, and had a very adventurous career. He is still considered one of the best writers of stories of adventure for boys. His books are very numerous. The best known are perhaps 'The Rifle Rangers,' 'The Scalp Hunters,' and 'The White Chief.' Joseph Sheridan Lefanu (1814–73), born at Dublin, was a grandson of Alicia Lefanu, sister of Richard Brinsley Sheridan. Lefanu's novels,

such as 'Uncle Silas,' 'The House by the Churchyard,' and 'In a Glass Darkly,' are weird and powerful, nor are they wanting in humor. His Irish historical novel, 'Torlogh O'Brien,' is one of the best of its class. He was the owner of several Dublin newspapers and did much political writing. His poems, 'Shemus O'Brien' and 'Phadrig Crohoore,' are still popular recitations. Many of Lefanu's sketches, stories, and poems were collected after his death and published under the title of 'The Purcell Papers.' Marmion Wilmo Savage (c. 1805–72), who is said to have been the inventor of the phrase 'Young Ireland,' wrote some witty and caustic novels, among which are 'The Bachelor of the Albany,' 'The Falcon Family,' and 'Reuben Medlicott.' Myles Gerald Keon (1821–75), born at Keon Brook, County Leitrim, wrote novels, like 'Dion and the Sibyls' and 'Harding, the Money-Spinner,' which had a great but rather ephemeral reputation. In 'Realities of Irish Life,' William Stewart Trench (1808–72) produced a clever but somewhat unfair work. Charles Joseph Kickham (1828–82), born at Mullinahone, County Tipperary, was on the staff of *The Irish People* at the crisis of the Fenian movement, was arrested and tried for treason-felony, and was sentenced to 14 years' penal servitude. His novels, 'Sally Cavanagh,' 'For the Old Land,' 'Knocknagow,' and 'Elsie Dhuv,' contain delightful pictures of Irish life and are brimful of humor and pathos. 'Knocknagow' is ranked as one of the really great Irish novels. It has been translated into Irish. His 'Rory of the Hill' is one of the best known Irish "rebel" poems. Justin McCarthy (1830–1912), born at Cork, was for the greater part of his life a journalist. He became a member of the British House of Commons in 1879 and was chairman of the Irish Parliamentary party from 1890 to 1896. He was a prolific and successful writer of novels, which are generally skilful in plot, incident, and character drawing, show traces of a gentle satire, and are written in a beautiful style. 'Dear Lady Disdain,' 'A Fair Saxon,' 'Donna Quixote,' and 'My Enemy's Daughter' are perhaps the best known. He was also poet, essayist, biographer, and historian. His 'History of Our Own Times' is his most important historical work. His son, Justin Huntly McCarthy (b. 1860) is also well known as poet, novelist, historian, and playwright. His farcical comedy, 'The Candidate,' was a great success. Other good plays of his are 'My Friend, the Prince' and 'If I Were King.' He has also made a fine rendering of the 'Rubaiyat' of Omar Khayyam. The Very Rev. Canon Patrick A. Sheehan (1852–1913) made a great name as a delineator of clerical life in 'My New Curate' and 'Luke Delmege,' and, in addition, he wrote other novels, as well as poems and graceful essays. Other novelists are Marguerite Power, Countess of Blessington (1789–1849); Mrs. S. C. Hall (1800–81); Rosina, Lady Lytton (1802–82); Jemima Montgomery, Baroness Tautphœus (1807–93); John Fisher Murray (1811–65), 'The Viceroy'; Mrs. Bell Martin (1815–80); Frances Brown (1816–79); Lady Emily Ponsonby (1817–77); Julia Kavanagh (1824–77); Annie Keary (1825–79), 'Castle Daly'; Frances Marcella O'Brien (1840–83); Katharine Mary Murphy (1840–85), 'Shane the Proud'; Charles Anderson Read (1841–78), 'Aileen Aroon'; Elizabeth Casey (c. 1845–94); Charlotte Grace O'Brien (1845–1909), 'Light and Shade'; Richard Dowling (1846–98), 'The Mystery of Killard'; Hester Sigerson (d. 1898), 'A Ruined Race'; Charlotte O'Conor Eccles (d. 1911), 'The Rejuvenation of Miss Semaphore'; Katharine Thurston; Mrs. Cashel Hoey (b. 1830); Mrs. J. H. Riddell (b. 1832); James Murphy (b. 1839), 'The Forge of Clohogue'; Mrs. Margaret T. Pender; Mrs. Sarah Grand, 'The Heavenly Twins'; Rosa Mulholland, Lady Gilbert (b. c. 1850), 'The Wild Birds of Killevy'; Clara Mulholland; William O'Brien (b. 1852), 'When We Were Boys' and 'A Queen of Men'; Richard Ashe King (b. c. 1852), 'The Wearing of the Green'; Edmund Downey (b. 1856), 'Through Green Glasses'; and Very Rev. Canon James Owen Hannay ("George Birmingham"), 'The Seething Pot' and 'Spanish Gold.'

The Irish poets of the 19th century are very numerous. In its earlier part all are more or less dwarfed by the outstanding genius and immense productivity of Thomas Moore (q.v.). Rev. Henry Francis Cary (1772–1844) is well known as the translator of Dante, Aristophanes, Pindar, and several early French poets. Thomas Dermody (1775–1802), born at Ennis, County Clare, brought out two volumes of poetry during his lifetime. After his death, his collected poems were published under the title of 'The Harp of Erin' in 1807. Sir Aubrey De Vere (1788–1846), born at Curragh Chase, County Limerick, was the author of 'Julian the Apostate,' a dramatic poem; 'The Duke of Mercia,' a historical drama; 'The Lamentations of Ireland'; and 'A Song of Faith, Devout Exercises, and Sonnets.' After his death, his 'Mary Tudor,' a historical drama, was published. His son, Sir Stephen De Vere (1812–1904), translated the 'Odes' of Horace and wrote several songs, including 'The Snowy-breasted Pearl,' already mentioned. Sir Stephen's brother, Aubrey Thomas De Vere (1814–1902), was the most distinguished of a highly literary family. He wrote a great deal of poetry, some of it excellent. His best known works are 'Innisfail,' 'May Carols,' and 'Legends of Saint Patrick.' He was also a clever craftsman in the sonnet. His prose works include 'English Misrule and Irish Misdeeds,' 'Picturesque Sketches of Greece and Turkey,' and two volumes of 'Essays.' John Martin Anster (1793–1867), born at Charleville, County Cork, wrote an 'Ode to Fancy and other Poems' and several translations from Goethe, Schiller, and De La Motte Fouqué. Thomas Furlong (1794–1827), born at Scarawalsh, County Wexford, wrote 'The Misanthrope,' 'The Plagues of Ireland,' and 'The Doom of Derenzie.' Many of his translations from the Irish appeared in Hardiman's 'Irish Minstrelsy' in 1831. Jeremiah Joseph Callanan (1795–1829), born at Cork, who has been described as "the first of the really Irish writers of English verse," was an admirable poet. He wrote 'The Recluse of Inchidony and other Poems.' Some of his short pieces, like 'The Lay of Mizen Head,' 'Avondhu,' and, especially, 'Gougane Barra,' have become famous. George Darley (1795–1846), born at Dublin, was not only a poet but also a first-class mathematician, and he published some scientific books. Among his poetical works are 'The Errours of Ecstasie,'

a dramatic poem; 'Labours of Idleness'; 'Sylvia, or the May Queen,' a lyrical drama; 'Nepenthe'; 'Thomas à Becket' and 'Ethelstan,' both dramatic chronicles; and 'The Lammergeier.' Darley was considered by some of his distinguished contemporaries to be an excellent poet. John Francis Waller (1809–94), born at Limerick, was a prolific verse writer and general litterateur. He was editor of *The Dublin University Magazine*, and wrote largely for annuals and monthlies. His publications include 'The Slingsby Papers,' in prose and verse; 'Ravenscroft Hall and other Poems'; 'The Dead Bridal, a Tale of Venice'; 'Peter Brown, Poet and Peripatetic'; and 'Festival Tales.' Many of his songs were set to music by distinguished composers. Sir Samuel Ferguson (1810–86), born at Belfast, is among the best of the Irish poets, and there are not wanting good judges who class him as the greatest of all. He was a barrister, but ceased to practise law when, in 1867, he was appointed deputy-keeper of the public records in the Irish Record office. He made his poetical reputation in the first instance with 'The Forging of the Anchor,' published in *Blackwood's Magazine*. This was followed by 'Lays of the Western Gael'; 'Congal,' an epic poem in five books; and 'Deirdre,' a one-act drama. 'Hibernian Nights Entertainments' is a collection of prose stories varied by verse. His humorous prose work, 'Father Tom and the Pope,' had an immense popularity.

Thomas Osborne Davis (1814–45), born at Mallow, County Cork, made a profound impression on his own and succeeding generations of Irishmen. He joined Sir Charles Gavan Duffy and John Blake Dillon in founding the *Nation* newspaper in 1842, and in the short interval that elapsed before his death he came to be recognized as the national poet *par excellence*, and the real leader of the Young Ireland party. Some of his pieces, like 'My Land,' 'Fontenoy,' and 'The Penal Days,' became instantly popular, and have remained so. The *Nation* became the focus of literary Ireland, and attracted a brilliant galaxy of writers of prose and verse. Among the latter may be named Hugh Harkin (1791–1854); Edward N. Shannon (c. 1795–1860); William Drennan, Junior (1802–73) and his brother John Swanwick Drennan (1809–93); Maurice O'Connell (c. 1802–53) and John O'Connell (1811–58), sons of the «Liberator»; James Clarence Mangan (1803–49); John De Jean Frazer (c. 1804–52); John Cornelius O'Callaghan (1805–83); Edward Walsh (1805–50); Michael Doheny (1805–63); John Keegan (1809–49); Arthur Gerald Geohegan (1810–89); Francis Davis, «The Belfast Man» (1810–85); John Fisher Murray (1811–65); Terence McMahon Hughes (1812–49); Rev. John Kenyon (1812–69); Rev. Charles Patrick Meehan (1812–90); John Thomas Campion (1814–94); William Dowe (c. 1815–1891); Kevin T. Buggy (1817–43); Michael Joseph Barry (1817–89); Denis Florence McCarthy (1817–82); Denny Lane (1818–95); Maurice Richard Leyne (c. 1820–54); Ralph Varian (c. 1820—c. 1886); Rev. Michael Toomey (1820–1893); William Pembroke Mulchinock (1820–64); Richard Dalton Williams (1821 or 1822–62); John O'Hagan (1822–90); John Edward Pigot (1822–71); Martin McDermott (1823–1905); Bartholomew Dowling (c. 1823–63); John Kells Ingram (1823–1907); Thomas Devin Reilly (1824–54); Michael Joseph McCann (c. 1824–83); Thomas D'Arcy McGee (1825–68); Richard Oulahan (c. 1825–95); Mary Anne Kelly [«Eva»], afterward Mrs. Kevin Izod O'Doherty (c. 1825–1910); Jane Francesca Elgee [«Speranza»], afterward Lady Wilde (c. 1826–96), mother of the celebrated Oscar Wilde (1854–1900); Ellen Downing [«Mary»] (1828–69); Joseph Brenan (1828–57); John Cashel Hoey (1828–92); John Charles Fitzgerald (fl. 1842); John Coen (fl. 1842); M. J. O'Keeffe (fl. 1843–48); J. S. O'Sullivan (fl. 1843); and Thomas Dillon (d. 1852).

James Clarence Mangan (1803–49), born at Dublin, was the greatest of the poets of the Young Ireland party and one of the greatest Anglo-Irish poets. He translated from many languages. His 'Dark Rosaleen' and 'Twenty Golden Years Ago' are very well known, but many others of his lyrics are just as well deserving of mention. Denis Florence McCarthy (1817–82), born at Dublin and professor of English literature for many years at the Catholic University there, translated into pure and beautiful English verse the dramas of Calderon, and was awarded the medal of the Royal Academy of Spain. Besides, he wrote many original poems, such as 'The Bell-Founder, 'The Bridal of the Year,' 'The Pillar-Towers of Ireland,' and 'The Voyage of Saint Brendan,' all characterized by beautiful imagery, fluency, and melody. Thomas Caulfield Irwin (1823–92), born at Warrenpoint, County Down, has been called «The Irish Keats.» He was a voluminous writer, and brought out eight books of verse between 1856 and 1889. He also wrote prose sketches, a poetic drama, entitled 'Ortus and Ermia,' and 'From Caesar to Christ,' an old-world romance, as well as translating Catullus and doing an enormous amount of magazine work. William Allingham (1824–89), born at Ballyshannon, County Donegal, one of the best of the Irish poets, entered the customs service as a youth. In 1864 he received a Civil List pension for literary services. Subsequently he became editor of *Fraser's Magazine*. Between 1850 and 1889 he published 15 volumes of poetry, some of it of great excellence. John Todhunter (1839–1916), born at Dublin, professor of English literature at Alexandra College in that city, is justly ranked high among modern poets. His published volumes are numerous, including lyrics, dramatic poems, a dramatic sketch, a pastoral play, and a dramatic cantata. His 'Helena of Troas' was produced on the stage with great éclat in 1886. He also wrote comedies, including 'The Black Cat,' as well as 'A Study of Shelley' and a 'Life of Patrick Sarsfield.' Edmund John Armstrong (1841–65) was a poet whose brilliant early promise was cut short by his untimely death. His brother, George Francis Savage-Armstrong (1845–1906), was professor of history and English literature at Queen's College, Cork. He was a noted poet, and published many volumes of verse. His reputation was so great that he was freely suggested for the Poet-Laureateship on the death of Tennyson. Edward Dowden (1843–1913), professor of English literature at Dublin University, wrote some poems, but he is better known as a biographer and critic. His 'Life of Shelley' and 'Shakspere: His Mind and Art' are standard works. John Keegan Casey (1846–70), well known as «Leo» of the later *Nation* and

other papers, was imprisoned in 1867 for his participation in the Fenian movement. He died in his 24th year, and it is said that 50,000 persons attended his funeral. His 'Rising of the Moon' is a stirring "rebel" poem. His love-poems, like 'Gracie og Machree,' 'Maire, my Girl,' and 'The Colleen Rue,' approach those of Burns.

The Irish historians and biographers of the 19th century are headed by Rev. John Lanigan (1758–1828), whose learned 'Ecclesiastical History of Ireland,' published in four volumes in 1822, is an enduring monument to his fame. Sir William Napier (1785–1860), himself a soldier, wrote a valuable 'History of the War in the Peninsula.' Rev. James Wills (1790–1868) was author of 'The Irish Nation, its History and Biography,' as well as of many poems. Richard Robert Madden (1798–1866) contributed greatly to the elucidation of historical, biographical, and literary details by his 'Lives of the United Irishmen,' 'Life of Lady Blessington,' 'History of the Penal Laws,' 'History of Irish Periodical Literature,' and 'Literary Remains of the United Irishmen.' He also wrote much verse. John Cornelius O'Callaghan (1805–83) wrote 'The Irish at Home and Abroad,' 'History of the Irish Brigades in the Service of France,' and 'The Irish in the English Army and Navy.' He was also author of 'The Green Book,' in prose and verse. 'The Cromwellian Settlement of Ireland,' by John P. Prendergast (1808–1893), is a work of great research. John Mitchel (1815–75), in his 'Jail Journal,' 'The Last Conquest of Ireland (Perhaps),' and the 'Apology for the British Government in Ireland,' has made a clever but bitter arraignment of English maladministration in his native country. Sir Charles Gavan Duffy (1816–1903), who was one of the leaders of the Young Ireland movement and afterward rose to a position of eminence in Australia, left monographs, valuable because of his first-hand knowledge, on 'Young Ireland' and 'Four Years of Irish History.' He also wrote a 'Life of Thomas Davis.' Some of his poems are still quite popular. Very Rev. Canon John O'Hanlon (1821–1905), scholar and hagiologist, was author of 'The Lives of the Irish Saints.' Over the signature of "Lageniensis" he published some volumes of verse. Thomas D'Arcy McGee (1825–68) was a very remarkable man, equally renowned as statesman, orator, historian, and poet. He took an active part in the Young Ireland movement, but his attitude toward the Fenian rising of 1867 brought about his assassination. He wrote numerous historical works, the chief of which are 'Irish writers of the Seventeenth Century,' 'History of Ireland,' 'History of the Irish Settlers in America,' and 'Life of Art McMurrough.' He also wrote a great deal of verse. Patrick Weston Joyce (1827–1914), an indefatigable toiler, produced several valuable works, including 'Origin and History of Irish Names of Places,' 'A Short History of Ireland,' and 'Social History of Ancient Ireland.' William John Fitzpatrick (1830–95), in 'The Life and Times of Dr. Doyle' and other biographies, rendered highly useful service. Another writer of interesting biographies was Joseph Fitzgerald Molloy (1859–1908). The greatest of modern Irish historians is undoubtedly William Edward Hartpole Lecky (1838–1903). His 'Leaders of Public Opinion in Ireland' and his 'History of England during the Eighteenth Century' (which includes five separate volumes on Ireland) are in a class by themselves. His 'History of European Morals from Augustus to Charlemagne' is a standard work. Richard Barry O'Brien (1847–1918) wrote Lives of C. S. Parnell, Lord Russell of Killowen, and Thomas Drummond. His 'Fifty Years of Concessions to Ireland' and other historical works show a painstaking investigation of the vexed relations between Great Britain and Ireland. Other historical writers are William Cooke Taylor (1800–49); Martin Haverty (1809–87), 'History of Ireland'; Rev. Charles Patrick Meehan (1812–90), 'Fate and Fortunes of Tyrone and Tyrconnell'; and Alexander Martin Sullivan (1830–84), 'The Story of Ireland' and 'New Ireland.' Eminent archaeologists were George Petrie (1789–1866); Rev. James Henthorn Todd (1805–69); and Sir John Thomas Gilbert (1829–98).

The principal essayists were James Fintan Lalor (d. 1849), whose theories on the private ownership of land, contributed to the *Nation* and the *Irish Felon*, were afterward given a wide circulation in the writings of Henry George; Rev. Joseph Farrell (1841–85), author of the delightful 'Essays of a Certain Professor;' and Frances May Synge, afterward Mrs. James Owen (1842–83), whose posthumously published book, 'Essays and Poems,' contains papers on Shakespeare, Wordsworth, Browning, and other poets. The two great wits and scholars were William Maginn (1793–1842) and Rev. Francis Sylvester Mahony, "Father Prout," (1804–66). Maginn was for several years one of the regular contributors to *Blackwood's Magazine*, and later became editor of *Fraser's Magazine*. It was he who conceived the idea of the 'Noctes Ambrosianæ' and wrote much of it. His parodies, stories, essays, reviews, etc., were collected and published as 'The Maxims of Sir Morgan O'Doherty' and 'Shakesperean Papers — Pictures Grave and Gay.' He also wrote 'Homeric Ballads' and several novels. Mahony was a priest who abandoned his sacerdotal functions and became a journalist. He wrote for many magazines, such as *Fraser's*, *Bentley's Miscellany*, and the *Cornhill*. His works are contained in 'Reliques of Father Prout' and 'Final Reliques of Father Prout.'

Other later writers are dealt with in the article on the IRISH LITERARY REVIVAL.

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IRISH MELODIES. Thomas Moore (1779–1852), though of humble Irish extraction and a Roman Catholic, made a social success in London as a young man by his charming personality and his ability in singing his own 'Odes of Anacreon.' To continue this success he composed 'Irish Melodies' at intervals between 1808 and 1834. He was not disappointed in his venture. These songs augmented his welcome in society, and when published, eventually with the express stipulation that the author sing them in great houses, brought him £12,810.

Yet 'Irish Melodies' do not owe all their fame to Moore's playing minstrel for himself. The captivating music supplied by Sir John Stevenson, the themes of the songs and their author's poetic skill were greater reasons for success. Moore, who had known Robert Emmet and had sympathized with the United Irishmen, deftly turned the hopes and wrongs of Ireland, with the usual admixture of love, war and honor, to picturesque and sentimental, but never to dangerous or revolutionary purposes. No subjects are more popular, especially among comfortable people, with no occasion to use the stern virtues with which the poet adorns his song. Moore owed much also to his melodious, if facile and insipid, verse, and to his ease in handling the conventional romantic imagery. This skill appears at its best in such splendid openings as "Oh! breathe not his name," with its reference to the fate of Emmet, "Go where glory waits thee," "The harp that once through Tara's halls," "The Minstrel Boy to the war hath gone" and the famous "The light that lies in woman's eyes." Moore was incapable of sustaining such a mood or style, and never safe from falling flat into false feeling and balderdash. Heroics are, however, bad form in a drawing-room, and 'Irish Melodies' are probably the best sentimental songs for the drawing-room ever written in English.

WILLIAM HALLER.

IRISH MOSS, an edible dulse or seaweed. See CARRAGEEN.

IRISH MUSIC. Guided by the authority of Irish ecclesiastical and secular literature, we are able to follow with certainty the general history of Irish music to a period much earlier than the introduction of Christianity into Ireland. In the ancient records of Ireland music blends itself so intimately with the life of the people that its history is as old as the history of the Irish race itself.

The old Irish musicians, so far as we are aware, used no musical notation. It is certain, indeed, that the airs forming the great body of Irish music are of very remote antiquity; but we are not able to trace their exact form and setting farther back than the time when they first began to be written down. In this respect the Irish are in exactly the same position as their Scotch neighbors. The ancient Irish evidently possessed a music constructed upon the old gapped quinque-grade scale, obtained from a circle of fifths, and possessing, no doubt, the peculiar rhythm which is still characteristic of Irish melody. The introduction of the *Cantus firmus* by the Church made the Irish musicians acquainted with the diatonic scale. As this scale also originated from a circle of fifths, it only differed from the gapped scale by the addition of two notes. The secular and church music being thus constructed in similar keys, it follows that, with the exception of the rhythm, there was nothing in old Irish secular music foreign to the system of the church music. Hence the latter influenced the former to such an extent that, in the case of many of the best Irish airs, it is difficult to say whether they were composed according to the old gapped quinque-grade scale or in one of the church modes. The polish and artistic style which distinguish genuine Irish harp airs are unquestionably due to the influence of the ecclesiastical chant. Indeed it is traditionally remembered that religious hymns were sung to many of the finest old Irish airs.

In the Middle Ages the music of the Irish was strictly homophonous, and remained essentially of the same character down to the extinction of the Irish harp about the time of the famine of 1847, as is proved by the use of the old keys of the gapped quinque-grade scale, more or less modified by the diatonic system of the old church chant and by the maintenance, even to the present time, of one of the most marked and antique characteristics of Irish music — the omission of the semi-tones. It requires no discussion to show that the principles of the harmony which grew up during the 14th, 15th, 16th and 17th centuries, and which have created a gulf, as it were, between modern and ancient music, could not have been applied to Irish music without obliterating all traces of the antique characteristics above mentioned, and otherwise profoundly modifying its whole character. But if the Irish *Timpan* resembled the Welsh *Crwth* of the 18th century, as has been very probably the case, the Irish must have been acquainted with the rudiments of harmony. We have no means of knowing to what extent this rude harmony was used or when it was first introduced. It was probably the primitive *Organum* introduced into Ireland from the Continent and not a species invented in Ireland itself. It may safely be assumed that the practice of harmony was of ecclesiastical origin and could only have grown up where the artistic music of the Church was not only performed but noted. Meagre as are the references to polyhonous music in Irish manuscripts, we may be sure that each successive advance in harmony became known in Ireland. Norman minstrels brought the music, the instruments and the dances of France into Ireland in the 13th and 14th centuries. During the same period Anglo-Norman ecclesiastics introduced the polyhonous church music, then beginning to assume great importance in the churches of France and Flanders. There is reason to believe that *Discant* was known among Irish ecclesiastics. The *Burdoon* method of singing, which still persists in remote parts of the Gaelthacht, or Gaelic-speaking portion of Ireland, is a species of *Organum,* or harmonic accompaniment apparently derived from a French source.

Even where social and political conditions were favorable to the growth of art, the practice of the complicated artistic polyphony of the 14th and 15th centuries required resources which could only be found in the courts of princes, in large cathedrals or in rich abbeys. Notwithstanding the great intercourse between Ireland and France and the Low Countries at the period when Flemish polyphony was at its zenith, the unhappy political and social state of Ireland was wholly incompatible with the artistic cultivation of music. The introduction of Protestanism arrested the fusion of the native Irish and the English colonists, and the growth of those political institutions which would have been the necessary outcome of such a fusion; it also completely isolated Irish music. Irish harpers no longer wandered over Europe; French jongleurs and minstrels had indeed al-

ready ceased to visit Ireland, according as English supplanted French as the language of the Norman nobility. The Catholics, deprived of their cathedrals and abbeys, and ultimately forbidden all public worship, could no longer use even the simple chants of the Church. The new harmonic music, which received in one direction so powerful an impulse from Protestantism, was introduced into the Protestant churches of the cities; but it exerted no influence whatever on the popular music, owing to the impassable gulf which existed between the Irish people and the whole English system, political and religious.

At the beginning of the 18th century the native Irish were for the moment effectually crushed; the Catholic gentry were either pauperized or in exile. At the cost of the intellectual death of the majority of the Irish people, the minority at home purchased a certain kind of tranquillity, and this in turn led to the partial revival of art and learning among the Protestant Irish gentry. Protestant hymnology, and especially the fine choral service of the English Church, created a taste for artistic music, and the works of foreign composers accordingly found their way into the circles of the wealthy. The influence of this foreign music is perceptible in the Irish music which was composed or modified about this time. Carolan, the best known composer of Irish airs in the 18th century, is a good example, being influenced by Geminiani, Corelli, Vivaldi and others of his contemporaries. This influence is especially perceptible in his 'Planxties,' or dance tunes.

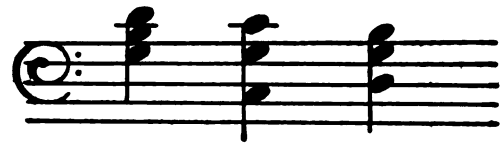
It would appear that the transformation of the Irish homophonous music into harmonic music really began about this period. But the change was soon arrested. For while on the one hand the political and social slavery of the majority of the nation — of that part who possessed and cherished the tradition of the Irish past — rendered the rise of a school of genuine Irish music impossible, on the other hand the increasing wealth and facilities of traveling brought the Irish gentry more and more under English and foreign influences, and diminished day by day that taste for Irish music which they had begun to imbibe during the brief period of their previous seclusion. The Irish harper, no longer meeting with the same welcome at the festive board, gradually became extinct, and Irish music found a last refuge in the homes of the peasantry. But this isolation, while preserving it for some time longer from being transformed like the popular music of other countries, also shut it out from all true artistic development, and left it entirely in the hands of itinerant pipers and fiddlers.

Harmonic music has now penetrated the last retreat of Irish music. The piper, like the harper, is gradually becoming extinct, and in a few years more every sound of the old music of Ireland will be extinct. The irresistible influence of the opera and of harmonized sacred music, which have now penetrated into every part of Ireland, would have been sufficient of themselves to rapidly eject old Irish music; the more so, as a modification in the esthetic feeling of the people has been slowly taking place during nearly a century. Another patent influence has been the introduction of bands. Since the music of a modern band must necessarily be harmonized, the popular ear is being gradually trained by these bands to harmony.

This disappearance of Irish music before harmonic music is as inevitable as the disappearance of the red man before the ever encroaching white.

A few Irish melodies figure in modern operas; as for example 'Eiblin a ruin,' which under the name of 'Un air ecossais,' constitutes the principal theme in the overture of Boieldieu's 'La dame blanche,' and 'The Last Rose of Summer,' in Flotow's 'Martha.' The compass of the harps was from C to d'''. Their scale was sometimes C, but mostly that of G. It has been proved that the old harpers played with their nails, not the fleshy tip of the fingers.

Examples of almost all the church modes are to be found in Irish airs, as in those of Great Britain, France and other countries. The old Irish bagpipe was blown by the mouth, like the Scottish, but the later bagpipe, the Uillean or Union pipe, blown with a bellows became popular in Ireland. From this cause, and the delicacy of its reeds, the tone is softer. Burney remarked upon the perfection of the intervals of the Irish chanter, or melody-pipe, which he had never met with in the pipes of North Britain. The scale of the Irish bagpipe is from C below the treble stave to C above it, with all the semitones. The Irish instrument is also furnished with a sort of tenor harmony of chords,



The pipe of Scotland has nothing of this sort, and its scale is only nine notes in extent, and does not correspond with the normal diatonic scale. There generally are two drones in the Scottish pipe, A and its octave; and three in the Irish instrument, generally C, c, and c'. The ancient Irish bagpipe, like that of Scotland, was an instrument of shrill and warlike tone, by which the natives were animated as other people are by trumpets. The bagpipe, perhaps the oldest and most widely known instrument in the world, still subsists in Ireland; the harp, however, is almost extinct; both have been in a great degree superseded by the violin and flute, which are cheaper, more readily repaired, more portable; most of the ancient minstrels of Ireland maintained attendants to carry their harps. From 1775 to 1782 the Volunteer Bands did much toward the cultivation of music in Ireland, and during the 19th century the bands of the Father Mathew societies, the semi-military organizations and the political organizations have made brass and reed bands popular. Choral classes are now popular in all parts of the country. Among the ancient Irish wind instruments were: the *Ben buabhal*, or wild-ox horn; the *Buine*, a kind of oboe, the *Guthbuine*, a type of bassoon; the *corn*, a pipe; the *Stoc*, a small trumpet; the *Sturgan*, a trumpet; the *Feadan* or fife, the *tympan*, played with a bow, and the *craobh ceoil*, or musical branch. All pipes were curved, no straight pipes have been found in Ireland. The harp was the instrument most highly developed, and the specimens of this in-

strument which are extant show a wide variety, thus the so-called Harp of Brian, in Trinity College has 30 strings, the Robin Adair harp, now at Holybrook, County Wicklow, 37 strings; and the Fitzgerald harp, of 1621, 52 strings. Among the great performers on the harp were Rory Dall O'Cahan, Miles O'Reilly, Thomas and William O'Conellon (1640); Cornelius Lyons; O'Carolan (1670); Charles Byrne (1712); Mongan (1715); Kane (1720). The last-named traveled on the continent and performed before the Pretender, and was hospitably received by the exiled Irish in Spain and France.

It may be interesting to give some estimate of the total number of Irish airs which have been preserved. Buntings' three volumes (1796, 1809, 1840), contain about, 295 airs; Petries' 'Ancient Music of Ireland', 182; Hoffmann's edition of another part of the Petrie collection, 202; Joyces' 'Ancient Irish Music', 100; The Stanford edition of Petrie contains 1,000 airs not printed elsewhere. There are 2,851 airs in Francis O'Neill's two volumes on Irish folk music and 842 in Joyce's 'Old Irish Music and Songs.' Allowing for duplications a safe sum total of about 3,100 different Irish airs are now preserved in these printed collections. There remain in known MSS. hundreds of airs, which require careful examination to avoid duplication.

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IRISH PALE. See IRELAND—HISTORY.

IRISH PRESBYTERIAN CHURCH, formerly called the Synod of Ulster. Its members are mostly descended from the Scotch Presbyterians, who migrated to Ireland by invitation of James II, between 1609 and 1612, to colonize Ulster. They number (1917) 440,525. There are two Presbyterian colleges, one at Belfast which is theological only, and one at Londonderry which has also literary and scientific departments.

IRISH REBELLION. The Irish Rebellion of 1916, an abortive attempt to throw off British rule in Ireland and to establish a republic, was a phase and an issue of the Home Rule (q.v.) movement since 1912. In April of that year Mr. Asquith had introduced the third Home Rule Bill, which met with violent opposition from the Ulster Orangemen. A secret force entitled the "Ulster Volunteers" had been formed to resist by force the application of the Home Rule Bill to that province. In July 1913, the force was formally inaugurated and its objects openly avowed. Arms were imported under cover and training camps formed. As a counterblast to the movement, the Home Rulers formed the Nationalist Volunteer Force, which rapidly grew in numbers and received the formal recognition of Mr. Redmond in June 1914. Hence, at the outbreak of the European War, there were in Ireland two unofficial, unauthorized, and certainly illegal, "armies," with diametrically opposite aims. They were, moreover, drilled and fairly well equipped. So much inflammable material could not fail to bring about disastrous results. Only a week before the European crisis had reached its culminating point in declarations of war between the Great Powers, the Nationalist Volunteers had landed some 3,000 rifles, when the police, who had intercepted the Volunteers on their march back to Dublin, came into conflict with a crowd of nationalist sympathizers, who began to throw stones and other missiles. The troops (Scottish Borderers) were called out and a volley was fired. Four persons were killed and many injured. The assistant commissioner of police, Mr. Harrel, who had called out the troops, was immediately suspended, and the British Government ordered an inquiry into the case. On 3 Aug. 1914, the day before Great Britain declared war on Germany, Mr. Redmond made a declaration in Parliament that the government might safely withdraw all their troops from Ireland and leave it to be defended by the Nationalist and Ulster Volunteers working loyally together.

Events soon proved, however, that Mr. Redmond's sincere optimism was ill-founded; a definite split appeared in the ranks of the Volunteers. Hardly had the Irish statesman assured the House of Commons that the British Empire could count on Ireland's solidarity in regard to the war, when the first rumblings of the approaching storm could be heard. Just before Premier Asquith visited Dublin on 5 Sept. 1914, the extremist majority of the Volunteer leaders published a manifesto in which they attacked Mr. Redmond in the following unmistakable terms: "Ireland could not with honor or safety take part in foreign quarrels other than through the action of an Irish Parliament," and that they repudiated "the claims of any man to offer up the blood and lives of the sons of Ireland and Irishmen while no National government which could act for the people of Ireland is allowed to exist." On 25 Oct. 1914 this attitude was even more definitely expressed in the following declaration of principles adopted by a convention of the extremists: (1) "To maintain the right and duty of the Irish nation to provide for its own defence by means of a permanent armed and trained Volunteer Force; (2) to unite the people of Ireland on the basis of Irish nationality and of common interests; to maintain the integrity of the nation, and to resist any measures tending to bring about or perpetuate disunion or the partition of the country; (3) to resist any attempts to force the men of Ireland into military service until a National government is empowered by the Irish people themselves to deal with it; (4) to secure the abolition of the system of governing Ireland from Dublin Castle, and the establishment of a National government in its place."

With few exceptions the leaders of the revolutionary section of the Volunteers were comparatively unknown men. They were nearly all of the "intellectual" class, idealists, scholars, men of letters, or artists. Patrick H. Pearse, "Commandant-General" and "President of the Provisional Government" of the "Irish Republic," was an educator conducting a boys' school in which Irish was spoken, Saint Enda's, at Rathfarnham near Dublin. He was also known as a poet of considerable force. John MacNeill, President of the Vounteers, but in the end not

an active participant in the rebellion, was a professor of ancient and mediæval Irish history in the National University. He was one of the foremost Celtologists and a frequent contributor to reviews. Thomas J. Clarke was a revolutionist from early youth; he had served 15 years in prison for a political dynamite outrage, and in later years owned a newspaper and tobacco store in Sackville street, Dublin. Thomas MacDonagh was a member of the faculty of University College, Dublin, and one of the most powerful of the younger Irish poets. Joseph Plunkett, a son of Count Plunkett, was a writer and editor. Edward Kent was connected with the Dublin Corporation and was also known as a writer. James Connolly was a socialist and a labor leader, author of 'Labour in Irish History.' Sean MacDearmada was the editor of *Irish Freedom*. Sir Roger Casement was a retired member of the British Consular Service who had won knighthood as well as international fame by his investigations into the rubber atrocities in the Belgian Congo and in the Amazon Valley of Peru. (See CASEMENT, SIR ROGER). Major John MacBride fought on the side of the Boers with an Irish brigade in the South African War. He married the beautiful Miss Maude Gonne, who gained a brief notoriety by her violent anti-English propaganda during the same war.

It was due especially to the efforts of Sir Roger Casement that the Irish extremists received extensive financial and moral support from Irish-American organizations who were in sympathy with their policy. In December 1914 he proceeded to Germany and there, through previously established connections, succeeded in gaining financial support and promises of actual assistance with arms and men from the German government. In the meantime his coworkers in Ireland had concentrated their energies to improving the organization of the Volunteers. As many arms and as much ammunition as could be bought and smuggled into Ireland were assembled and distributed. The men were drilled and manœuvres were held, which naturally did not escape the attention of the authorities. But the latter underestimated both the extent and strength of the movement and did nothing to suppress it. Late in March 1916 the police at Tullamore, King's County, attempted to disarm the local Volunteers as a result of a hostile demonstration made before their meeting place. A few days later the Council of the Volunteers issued the following manifesto, which practically amounted to a declaration of war, though even that failed to arouse the authorities at Dublin Castle or the Chief Secretary, Mr. Birrell, in London; "With regard to the recent proceedings of the government towards the Irish Volunteers, the Council . . . wish to warn the public that the general tendency of the government's action is to force a highly dangerous situation . . . the Volunteers cannot submit to being disarmed either in numbers or detail without surrendering and abandoning the position they have held at all times since their first formation. The raiding for arms and the attempted disarming of men, therefore, in the natural course of things can only be met by resistance and bloodshed. None of the Irish Volunteers recognize, or will ever recognize, the right of the government to disarm them or to imprison their officers and men in any fashion." The manifesto also suggested that the hostile demonstrations by crowds were carried on under government approval. As an offset to this it may be said that the government, having its hands full with the war in Europe, was most anxious above all things to prevent any rupture in Ireland, and made no single move whatever that might lead to any outbreak by provocation. They deliberately shut their eyes and refused to see the smouldering volcano that was soon to burst into fierce eruption.

By 12 April 1916 Sir Roger Casement had completed his arrangements with the German authorities and set out from Wilhelmshaven in a submarine, accompanied by another submarine and the steamship *Aud*, bearing arms and munitions. The British government was fully advised of his activities and plans; he was seized shortly after landing on Good Friday, 21 April 1916, near Ardfert on the southwest coast of Ireland. The *Aud* was stopped by a British patrol boat, and when about to be taken into Queenstown was abandoned by her German crew after being scuttled. The vessel sank, her entire crew was captured, and the submarines made their escape. As soon as the news of Casement's capture and the failure of his expedition was received at Dublin Castle, a meeting of the executive authorities was held on Saturday, 22 April, at which it was decided to issue warrants for the arrest of all the Sinn Fein leaders of the Volunteers. These warrants were promptly signed by the Lord Lieutenant, Lord Wimborne. The authorities were naturally well aware that the arrests, which were to be accompanied by the wholesale seizure of the Volunteer headquarters and the confiscation of arms and munitions, could not be accomplished without considerable fighting. As the number of troops available at the time in Dublin seemed insufficient for the purpose, it was decided to postpone the execution of the plan for a few days until reinforcements should arrive. It appears that every move decided on by the British authorities promptly found its way to Volunteer headquarters, but direct news about Casement's failure was still lacking. A party of Sinn Feiners had been sent from Dublin in an automobile to meet Casement; on their arrival at the coast they learned of Casement's arrest and immediately set back for Dublin at full speed. The car, however, came to grief on the road and every occupant excepting only the chauffeur was killed.

While the officials were deliberating in Dublin Castle, the Volunteer leaders were also gathered in conclave on 22 April. Opinion was divided as to the most desirable step to be taken next. The majority apparently advocated carrying through the original plan — the instant mobilization of all the Volunteer forces throughout Ireland. What was actually decided upon at that meeting cannot be stated with any degree of certainty, but on the following day, Saturday, John MacNeill published over his signature in the Irish newspapers an order that "Owing to the very critical position, all orders given to Irish Volunteers for tomorrow, Easter Sunday, are hereby rescinded, and no parades, marches or other movements of Irish Volunteers will take place. Each indi-

vidual Volunteer will obey this order strictly in every particular." At the eleventh hour it seemed that wiser counsels would prevail, but at another meeting of the leaders on that Sunday the bellicose majority carried the day, and it was decided to go ahead regardless of consequences. In face of the confusion that was sure to result from MacNeill's order, and in spite of the knowledge that this order would practically cancel whatever uprisings had been planned in the districts outside of Dublin, the decision for immediate action was largely influenced by the feeling that MacNeill's published order would mislead the authorities and throw them off the scent. In this assumption the Sinn Feiners were justified by results, for when the rebellion actually broke out it caught the British authorities entirely off their guard. In order to lull them still further into a false feeling of security, another command was published over the signatures of MacDonagh and Edward de Valera which read: "As publicly announced the inspection and manœuvres ordered for this day are canceled. All Volunteers are to stay in Dublin until further orders." On the morning of Easter Monday, however, the following order was issued: "Dublin Brigade Order, Headquarters, 24 April 1916. The four city battalions will parade for inspection and route march at 10 A.M. to-day. Commandants will arrange centres. Full arms and equipments and one day's rations." It was signed by Pearse and MacDonagh. Not even then did the mass of the Volunteers know what their leaders had decided on. They obeyed the order and when at the very last moment they were told that it had been decided to start immediate action, they proved how successfully they had been trained and disciplined in loyalty by following unquestioningly the lead of the men who now summoned them to active rebellion against the British government.

A few minutes after 12 o'clock noon on Easter Monday things began to happen in Dublin. An unarmed policeman on duty outside Dublin Castle was killed by a shot from a Volunteer rifle. Immediately after the general post office on Sackville street was rushed and occupied by the rebels. There the "Provisional government of the Irish Republic" was established. The colors of the new republic—green, orange and white—were run up over the building and the following proclamation posted on the main entrance:

THE PROVISIONAL GOVERNMENT OF THE IRISH REPUBLIC.

"TO THE PEOPLE OF IRELAND:

"Irishmen and Irishwomen! In the name of God and of the dead generations from which she receives the old traditions of nationhood, Ireland, through us, summons her children to her flag, and strikes for her freedom.

"Having organized and trained her manhood through her secret revolutionary organization, the Irish Republican Brotherhood, and through her open military organizations, the Irish Volunteers and the Irish Citizen Army, having patiently perfected her discipline, having resolutely waited for the right moment to reveal herself, she now seizes that moment, and supported by her exiled children in America and by gallant allies in Europe, but relying in the first on her own strength, she strikes with full confidence of victory. We declare the right of the people of Ireland to the ownership of Ireland, and to the unfettered control of Irish destinies, to be sovereign and indefeasible. The long usurpation of that right by a foreign power and government has not extinguished the right, nor can it ever be extinguished except by the destruction of the people. In every generation the Irish people have asserted their right to National freedom and sovereignty; six times during the past three hundred years they have asserted it in arms. Standing on that fundamental right and again asserting it in arms in the face of the world, we hereby proclaim the Irish Republic as a Sovereign Independent State, and we pledge our lives and the lives of our comrades in arms to the cause of its freedom, of its welfare, and of its exaltation among the nations.

"The Irish Republic is entitled to, and hereby claims, the allegiance of every Irishman and Irishwoman. The Republic guarantees civil and religious liberty, equal rights and equal opportunities to all its citizens, and declares its resolve to pursue the happiness and prosperity of the whole nation and of all its parts, cherishing all the children of the nation equally, and oblivious of the differences carefully fostered by an alien government, which have divided a minority from the majority in the past.

"Until our arms have brought the opportune moment for the establishment of a permanent National Government, representative of the whole people of Ireland, and elected by the suffrages of all her men and women, the Provisional Government, hereby constituted, will administer the civil and military affairs of the Republic, in trust for the people.

"We place the cause of the Irish Republic under the protection of the Most High God, Whose blessing we invoke upon our arms, and we pray that no one who serves that cause will dishonour it by cowardice, inhumanity or rapine. In this supreme hour the Irish nation must, by its valour and discipline, and by the readiness of its children to sacrifice themselves for the common good, prove itself worthy of the august destiny to which it is called.

"Signed on behalf of the Provisional Government.

"THOMAS J. CLARKE.

"SEAN MACDEARMADA. THOMAS MACDONAGH.
"P. H. PEARSE. EAMONN CEANNT. (EDWARD KENT).
"JAMES CONNOLLY. JOSEPH PLUNKETT."

The rebels immediately proceeded to fortify the general post-office and to occupy houses commanding the corners of various streets leading into Sackville street. Another body of Volunteers commanded by Countess Markievicz (q.v.) entrenched themselves in Saint Stephen's Green, a small park facing the Catholic University College and the Royal University grounds. The four courts on the banks of the river Liffey, Liberty Hall, the South Dublin Union, Jacob's Biscuit Factory and Boland's Mills at Ring's End were seized by other detachments. Various private houses all over the city at strategic points where troops might approach were also occupied and fortified. Three of Dublin's five railroad stations were likewise occupied or else lay well within the area controlled by the Volunteers. Despite warnings and premonitions the British authorities were totally unprepared to deal with the situation. Officers and men of the garrison were away at a local race meeting, and Dublin Castle "mustered half a dozen men with blank cartridges." All the telegraph wires at the post office were cut, but the rebels did not seize the central telephone exchange, a fact that enabled the authorities to maintain communications with the rest of the city and its environments. Before the evening of the first day of the rebellion the entire centre of Dublin was in the hands of the rebels, as well as a carefully chosen cordon of positions in the outlying districts beyond. The only exception was Trinity College and the adjoining park. Here a group of the Officers' Training Corps located at the college, reinforced by a small number of soldiers who happened to be passing, barricaded the doors of the college and put the buildings in a state of defence. This position, which was afterward of great value to the British troops, was held by the small force of defenders until it was relieved by the soldiers. It was primarily due to the fire which could be directed from Trinity College in the direction of the most important business streets

that the Volunteers were unable to gain a footing in them, and those streets were therefore safe from destruction when the British troops attacked with artillery to drive out the rebels. The Volunteers had also seized an ammunition magazine in Phœnix Park, but this was the first position regained by the troops.

During the night the Custom House, commanding the approach to the docks, was occupied by British troops, and steps were taken to relieve the Castle. On Tuesday, 25 April, martial law was proclaimed in the city and county of Dublin, and on Wednesday this was extended to cover the whole of Ireland for a period of one month. On the same day another proclamation ordered all persons to keep within their homes between the hours of 7.30 P.M. and 5.30 A.M.; also, the right to trial by jury was suspended in Ireland. Reinforcements of British troops arrived in Dublin on Tuesday; communication was re-established with the Castle and the small force holding Trinity College. In order to secure the safety of the Castle it was first necessary to expel the rebels from a number of buildings and houses commanding the Castle Yard, among which was the City Hall. This was accomplished only after desperate fighting; a military cordon was then thrown around the northern part of the city. Meanwhile more British troops were arriving from England, and on Wednesday they were in sufficient strength to assume the offensive. During Wednesday severe fighting occurred, especially in the vicinity of Trinity College. The troops encountered the most determined resistance everywhere and the losses on both sides were heavy. On that day Liberty Hall, the headquarters of the Volunteers, was attacked with guns and demolished. This was accompanied by bitter fighting in the Sackville street section. During the following night the first of a long series of fires in that part of the city broke out, creating enormous damage. Some 200 buildings were destroyed before the end of the week. The British government, now thoroughly alive to the danger, continued to pour troops into Dublin; Gen. Sir John Maxwell, who had been placed in supreme command, arrived on Friday from England. On Thursday the Sackville street section had been surrounded with a strong cordon of troops, that was held continuously for two days. The position of the rebels was rapidly becoming more and more hopeless; the various cordons were gradually drawn tighter and the Volunteers were driven back step by step in spite of desperate resistance. This "squeezing out" process was carried out in accordance with the following proclamation issued by Sir John Maxwell: "Most rigorous measures will be taken by me to stop the loss of life and damage to property which certain misguided persons are causing by their armed resistance to the law. If necessary I shall not hesitate to destroy all buildings within any area occupied by the rebels, and I warn all persons within the area now surrounded by His Majesty's troops to leave such areas under the following conditions: (a) Women and children may leave the area from any of the examining posts set up for the purpose, and will be allowed to go away free. (b) Men may leave by the same examining posts and will be allowed to go away free, provided the examining officer is satisfied they have taken no part whatever in the present disturbance; (c) All other men who present themselves to the said examining posts must surrender unconditionally, together with any arms and ammunition in their possession." Both Pearse and Connolly — the latter had been wounded — issued proclamations on Friday the tenor of which indicated that the end was approaching. That of Pearse foreshadowed failure, while the document from Connolly gave an entirely wrong estimate of the situation; he referred to "our Allies in Germany" and wound up with "Courage, boys, we are winning . . ." Fighting continued throughout the morning of Saturday 29 April, when part of the post office was shot to pieces by British guns and the balance of the pile caught fire. In the early afternoon Pearse sent a Red Cross nurse to inquire about terms of surrender; he was informed that surrender would have to be unconditional. Shortly after he yielded to the inevitable and surrendered unconditionally at 2 o'clock in the afternoon of Saturday. He advised his followers of this step by the following document "In order to prevent the further slaughter of unarmed people, and in the hope of saving the lives of our followers, now surrounded and hopelessly outnumbered, members of the Provisional Government present at headquarters have agreed to an unconditional surrender, and the commanders of all Units of the Republican Forces will order their followers to lay down their arms." Connolly followed Pearse's lead and on Sunday MacDonagh, Kent and de Valera submitted likewise. Thus ended the Sinn Fein rebellion in Dublin, which lasted altogether a week. In the provinces the rebellion was actively supported in spots only; the outbreaks were of local extent and in general restricted to small areas, especially in the vicinity of the larger centres of population. The only exception was the city of Cork, one of the strongholds of the Irish Volunteers, where the authorities were able to suppress, at the first signs, all attempts at an uprising. Not until the end of the week following the fateful Easter week was peace re-established in the various parts of Ireland. The military casualties amounted to 106 killed and 334 wounded; the losses on the rebel side have never been ascertained, but 180 civilians were reported killed and 614 wounded. The leaders of the rebellion, all of whom had perforce surrendered unconditionally, were tried by Field Court Martial. Fifteen of the most prominent leaders were sentenced to death and shot: P. H. Pearse, T. MacDonagh, T. J. Clarke, Joseph Plunkett, E. Daly, M. Hanrahan, W. Pearse, J. MacBride, C. Colbert, E. Kent, M. Mallin, J. J. Heuston, James Connolly, Sean MacDearmada (MacDermot) and Thomas Kent, who was executed for the murder of a policeman. H. O'Hanrahan, Countess Markievicz, J. MacNeill and E. de Valera were also sentenced to death, but received a commutation to penal servitude for life. They were liberated under the amnesty of June 1917. Others, less prominently connected with the rebellion, received sentences ranging from three to ten years; they were also freed under the amnesty. The great body of the rebels, both those who had surrendered and others who had later been arrested on suspicion, were deported, to the

number of about 3,000, to a prison camp in England. Here they were carefully sifted; many were released after a short detention. About 2,000 were interned in Wales, but within three months 70 per cent of these were set at liberty. A particularly painful episode of the rebellion was the shooting of three innocent men, Mr. Francis Sheehy-Skeffington, an earnest pacifist, Mr. Dixon, an editor, and Mr. McIntyre, also a journalist. They were arrested on 5 April and taken to Portobello Barracks, where they were shot by order of Captain Bowen-Coulthurst without any trial. The Captain responsible for this deed was afterward court martialed, found to be insane, and incarcerated in a lunatic asylum. Sir Roger Casement was brought to trial for treason before the Lord Chief Justice and a jury. He was convicted, deprived of his titles and honors, and hanged on 3 Aug. 1916.

The rebellion and its collapse brought some remarkable political consequences in its train. On 3 May 1916 Mr. Augustine Birrell, Secretary of State for Ireland, resigned his office, confessing the total failure of the principles on which he had endeavored to govern Ireland for nine years. Sir Mathew Nathan, the Under-Secretary in Ireland, also resigned, to be followed in the same course a few days later by Lord Wimborne, the Lord-Lieutenant of Ireland. The resignation of the latter was not accepted. Strong charges were made in the House of Commons in regard to the operation of martial law, and public opinion in Great Britain was highly incensed against the officials who were declared to have "bungled" Irish affairs. Mr. Asquith decided himself to visit Ireland; he returned with the opinion that "Castle Government had entirely broken down." A Royal Commission, consisting of Lord Harding of Penhurst, Mr. Justice Shearman and Sir Mackenzie Chalmers, was appointed to inquire into the causes of the rebellion. The general conclusions drawn in their report (4 July 1916) were to the effect "that the main cause of the rebellion appears to be that lawlessness was allowed to grow unchecked, and that Ireland for several years past had been administered on the principle that it was safer and more expedient to leave the law in abeyance — if collision with any faction of the Irish people could thereby be avoided." The Lord-Lieutenant was absolved from responsibility, but the Commission found that "the Chief Secretary, as the administrative head of your Majesty's Government in Ireland, was primarily responsible for the situation that was allowed to arise and the outbreak that occurred." Sir Mathew Nathan was blamed because he did not sufficiently impress upon the Chief Secretary, during the latter's prolonged absence from Dublin, the necessity for more active measures to remedy the situation in Ireland, which in December last in a letter to the Chief Secretary he described as "most serious and menacing." On 19 Oct. 1916 Mr. Redmond moved a vote of censure in Parliament, demanding the abolition of martial law in Ireland and the immediate release of 500 Sinn Fein prisoners who still remained interned, the treatment of the sentenced rebels as "political" offenders, and the trusting of the people by putting the Home Rule Act into force. The government replied that Ireland could have Home Rule if Irishmen themselves agreed to it, but Ulster blocked the way; that two-thirds of the arrested Sinn Feins had already been released and that a considerable number of others could be released on giving an assurance not again to engage in rebellion. The vote of censure was defeated by 303 to 106 votes. In November Sir John Maxwell left Ireland and was succeeded by Gen. Sir Bryan Mahon.

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IRISH SCHOOLS AND SCHOOLMEN OF THE MIDDLE AGES. Christianity was introduced into Ireland in the 4th century and, after the year 432, the date of the arrival of Saint Patrick, spread with extraordinary rapidity. Within the generation after the death of the Apostle, monastic schools were founded with a view toward providing the people with a native ministry. The oldest and at the same time one of the most famous of these schools was founded in 450 at Armagh, the site of the religious metropolis of Ireland. Toward the end of the 5th and during the following centuries several colleges were established, the most celebrated being Noendrum, founded by Saint Mochua, Louth, by Saint Moctha, and Kildare, by Saint Brigit, in the 5th century; Clonfert, founded by Saint Brendan the Navigator, Clonard, by Saint Finnian, called "Magister Sanctorum Hiberniae," Clonmacnois, by Saint Ciaran, Arran, by Saint Enda, Bangor, by Saint Comgall, Glendalough, by Saint Kevin, in the 6th; and Lismore, founded by Saint Carthage, in the 7th century.

These communities were in reality little villages or Christian colonies, consisting simply of a collection of stone huts gathered around one or more diminutive churches. Each community was under the authority and guidance of some man remarkable for holiness or learning or both. While their chief function was doubtless originally religion, each establishment had one or more schools appended to it, wherein religion and science were blended as perhaps never before nor since. The love of learning among the early Christian Irish was intense, and no nation ever devoted itself to the things of the soul with so much ardor. There is not a life of an Irish saint that does not praise his love of learning. In the words of an 11th century writer, Ireland had become "virorum doctissimorum officinam," a workshop of learned men.

These schools were intended for two classes of students — monks and laymen. The schools

for the latter were really public schools to which the sons and sometimes the daughters, not only of the rich and noble but also of the poor and strangers, were admitted. The Venerable Bede gives eloquent testimony to the generosity of the Irish in providing students with free tuition, board and even the necessary manuscripts. Legal provision was made for secular teaching, and after the Convention of Druimceat in 890 the public schools were organized on a new and better basis, and the remuneration, rights, obligations and number of the professors were fixed by law. There were also bardic schools and professional schools of law and a traditional medicine, with the result that education was more widespread in early Christian Ireland than elsewhere in those days in Europe, and at least a certain amount of learning was almost as much a part of the training of an Irish chief or warrior as of an ecclesiastic.

Considerable information as to the regime of the early Irish schools is to be had in the lives of Irish saints. From them we learn that instruction was mostly oral and conducted in the open air, as far as possible. At first the teaching was in the hands of the founder himself or the superior of the monastery, but when the educational system became better organized it was delegated to a special officer called in Irish *fer legind*. The students took notes on wax tablets or, if more permanency was desired, on parchment.

The studies embraced in general those known on the Continent as the *trivium* and the *quadrivium*, in other words the seven liberal sciences, though the courses of instruction no doubt differed according to the profession which the student intended to follow, stress being laid in all the schools upon the principles of Christian doctrine, genealogy and the history, legends and lore of Ireland. Some of the pupils of those schools were distinguished for their knowledge of geometry and also of philosophy; Dicuil the Geographer had been educated at Clonmacnois; Colgu, who came from the same school, was the master of Alcuin, the most distinguished scholar of his time in Europe. The dispute about the paschal computation and the determination of the other movable feasts and cycles gave the Irish scholars the occasion to show the extent of their learning and their knowledge of mathematics and astronomy, which was amazing for the time. Many of the most distinguished men of science and religion also cultivated poetry and wrote hymns "ad canendum digna," as in the case of Saint Columbanus. The study of music and the illumination of manuscripts were also fostered, not only in Ireland but also in the Irish establishments on the Continent. In those two arts the Irish had no superiors. The Saint Gall music school, for example, an Irish foundation in Switzerland, became the most famous in Europe. Much attention was also given to the more or less pastime studies, such as swimming, the handling of arms and horsemanship, and a game resembling chess, called *fidchell*.

The centre of learning, however, was theology, which comprised of course the study of the Holy Scripture, the Fathers and the lives of saints, especially of Saint Martin of Tours. Never have the sacred books been regarded with greater affection nor their meaning more searchingly studied. Skilful and learned scholars commented upon them, at home and abroad, wherever they founded schools, the Irish scholars drew from them their inspiration and laid in them the foundation of all learning. The so-called 'Vetus Itala' was the version of the Bible in use in early Ireland, and the favorite Gospel seems to have been that of Saint John. The Book of Psalms in particular was the vade-mecum of praise and prayer. It was the first reader put into the hands of an Irish schoolboy, and many of the Irish saints were said to have learned the entire psalter by heart and recited the "Three Fifties," as they called the 150 psalms, daily. They were also sung antiphonally, when traveling. A number of anecdotes are told in the lives of the Irish saints to show the affection with which they regarded the Bible and their zeal in transcribing it. Of Columcille it is told that on the last day of his life he occupied himself copying part of the psalter, till, having finished a page in the middle of the thirty-third Psalm, he dropped his pen and said, "Let Baithen write the remainder." The manuscripts which were most profusely ornamented were those containing the Holy Scriptures, such for example as the Book of Kells, "the most beautiful book in the world," and special shrines wrought in precious metal were made to hold them. In library catalogues, the Bible always came first, and the oldest glosses in the Irish language are to biblical texts.

Irish no doubt was the language in which instruction was given, but there is abundant proof that the native scholars were equally at home with Latin. This is shown for example by the large number of treatises on Latin grammar glossed in Irish. Latin was studied chiefly with a view to the understanding of the Bible and the Church Fathers, and as a preparation for those who contemplated entering Holy Orders. Irish Latin is not always in the best taste, being often marred by affectation, a bombastic style, abuse of antithesis and exaggeration, but these were largely the faults of the period. Columbanus was by far the best Latin writer of his century, and the ease with which the Irish scholars wrote Latin shows that it must have been a living speech to them.

It is not quite certain how widely a knowledge of Greek was diffused in the schools of early Ireland. There has been much exaggeration on the subject. Some writers pretend that all the monks who accompanied Columbanus to the Continent had a fair knowledge of Greek, could transcribe Greek manuscripts and read the Gospels in that language. Some Irish authors of the 7th century quote such writers as Philo, Eusebius and Origen, but there is no serious proof that they knew them in the originals. Columbanus himself clearly knew Greek. His biographer states that he was a "man of three tongues," by which was meant that he added a knowledge of Latin and Greek (or perhaps Greek and Hebrew) to his own language. If he knew any Hebrew, which in his letter to Pope Boniface he says he did, it must have been very limited. He uses many Greek words and evidently knew Aristotle in the original. When we come to the 9th century, however, there is an abundance of proof that some Irishmen, both in Ireland and on the Con-

tinent, knew considerable Greek. They may have acquired it in the course of their travels, especially in France, and more particularly at Narbonne, where some Irish students had settled down and where Greek was spoken as a living language from early times. But that assumption is not necessary, for it is known that during the 6th and the three following centuries there was an influx into Ireland of Greek-speaking merchants from Bordeaux and other cities in the south of France. In an old Irish poem on the Fair of Carman, we find mention of "the great market of the foreign Greeks, where gold and noble clothes were wont to be." Many Greek ecclesiastics also had taken refuge in Ireland at the time of the barbarian conquest of Gaul, and as late as the 17th century there was a church at Trim which still kept the name of "the Greek church," or, according to another authority, "the school of the Greeks." In a letter of Saint Cummian of Clonfert and Durrow, written in the year 634 to the Abbot of Iona, are found quotations from Greek writers like Origen, Cyril, and Damascius, which shows that the range of reading in Greek was wide and not ecclesiastical merely but chronological, astronomical and philosophical. A collection of sayings called 'Proverbia Grecorum,' which was circulated in Ireland in the 8th and 9th centuries, was translated from Greek into Latin by some Irish scholar in Ireland before the 7th century. A manuscript at Würzburg, containing a copy of Saint Matthew's Gospel and dating from the 8th century, contains a curious entry to the effect that Sillan, a scribe and abbot of Bangor in the early part of the 7th century and called in the Antiphonary of Bangor "Famosus Mundi Magister," was the first Irishman to learn by heart a computus which he had got from a certain Greek. The Greek probably taught the Irishman other things also. In the Irish glosses on Priscian in a Saint Gall manuscript and in the 'Divinae Institutiones' of Lactantius several Greek words are explained, and in other Irish works such as Cormac's Glossary (9th century) and the 'Coir Anmann' (The Fitness of Names), are found Greek paradigms, declensions, and derivations, all of which give evidence of a certain knowledge of the language. Greek words also occur in an alphabetical hymn on Saint Comgillus, beginning "Audite pantes ta erga," and in a hymn in honor of Saint Patrick and Saint Brigit. In a manuscript at Laon is a Greek fragment of the Gospel of Saint John transcribed in Latin letters by an Irishman of the 8th or 9th century, which is proof that from very early Christian times there was at least a copy of the Greek text of the Gospel of Saint John, and perhaps of the entire New Testament, current in Ireland.

The Irishmen Sedulius and John Scotus Erigena, who flourished in the middle of the 9th century, were good Hellenists. The latter was the most learned man of his day in Greek and, at the request of Charles the Bald, translated from Greek into Latin for the newly founded Abbey of Saint Denis the apocryphal works of Dionysius the Pseudo-Areopagite, a feat that probably no other scholar in western Europe was capable of performing. He also wrote whole verses in Greek and seems to have read Plato's 'Timaeus' in the original. Even as late as the 10th century, when education had fallen very low in Ireland, we find King Cormac, Abbot-Bishop of Cashel, praised for his knowledge of Irish, Latin, Greek, Hebrew, Welsh, Anglo-Saxon and Norse.

A few Hellenisms are also found in the writings of Columcille and Adamnan. In the 'Amra,' or hymn of praise in honor of the former saint, composed by Dallan Forgall, he is said "to have conversed with an angel; he spoke in Greek grammar"; which is glossed: "that is, he made conversation with an angel, and he learnt grammar like Greeks; or, he conversed grammatically and in Greek." And one of the manuscripts containing his life by Adamnan, now at Schaffhausen and dating from the 8th century, is remarkable for the use of Greek characters in the colophon, and more especially in the copy of the Lord's Prayer which it contains. According to the life of Saint Brendan, it was required by the keeper of the church of Saint Gildas in Wales "to sing the Mass from a missal written in Greek characters." In the great Irish libraries at Bobbio and Reichenau copies of such Greek authors as Aristotle and Demosthenes have been preserved, some of them with Irish glosses showing that they were used by Irish students and that Greek formed part of their curriculum. There are, besides, Greek-Latin glossaries and paradigms of Greek declension, written by Irishmen in the 9th century, Greek words transcribed into Irish, that is with the Irish spelling, Greek biblical texts and Greek-Latin manuscripts of the psalms, one of which is ascribed to Sedulius Scottus, a Greek text of the Epistles of Saint Paul, a Greek text of the Four Gospels, the last two with interlinear Latin translations.

Many more instances might be cited to show that a knowledge of Greek existed in the early schools of Ireland. With the exception of a few conspicuous cases, however, that knowledge was not characterized by accuracy of scholarship or by a wide acquaintance with Greek literature. But enough has been said to prove that it was much more than an acquaintance with the Greek alphabet and a few technical terms and quotations picked up at second hand and peppered here and there in his Latin text to enhance the writer's reputation for learning. Greek survived in Ireland long after it had almost perished in the rest of Europe and wherever we hear of anyone knowing Greek in France or still more in Germany in the course of the 9th century he was almost certainly an Irishman or had gone to school to one.

The fame of the Irish schools for their teachers, their libraries and their system of education, all of which was far in advance of what was current at that day, attracted not only native students, but also great numbers from abroad who, coming to Ireland to complete their education, brought with them the manners and customs, and the learning, such as it was, of their native lands, so that while Ireland was giving of her best she was constantly receiving fresh elements of strength from without. The 'Félire,' or 'Calendar,' attributed to Oengus, who is said to have flourished about the beginning of the 9th century after Christ, gives the names of Britons, Saxons, Picts, Gauls, Germans, Romans and Egyptians buried in Ireland. One of the most famous of these foreigners was Willibrord, the apostle of the Frisians, in the first

half of the 7th century, of whom it is expressly stated that he spent 12 years in Ireland. The tomb of the Seven Romans is still to be seen in the churchyard of Saint Brecan in the isle of Aran. Many Breton saints are said to have received their education in Ireland. Mention has already been made of the church or school of Trim commonly known as the Greek church or school because served by Greek ecclesiastics. The Venerable Bede tells of a Frank named Agilbert, the future bishop of Paris in the middle of the 7th century, who for the sake of reading the Scriptures passed a considerable time in Ireland. Dagobert II, afterward king of Austrasia, sought and obtained education and entertainment at Slane in Ireland for many years previous to his call to the throne. Nor were foreign women unmindful of the educational advantages to be had there: Gertrude, Abbess of Nivelles, in the 7th century, for example, is said to have sent there for books and to have had the Irish Saints Foillan and Ultan as ' r advisers.

But of all the foreigners who flocked to the Irish schools, whether for the purpose of acquiring wisdom or of leading a life of stricter discipline, the students from England were the most numerous. In fact during the entire 7th and 8th centuries the Anglo-Saxons regarded Ireland as their university. Bede's 'Ecclesiastical History' is our greatest source of information on this subject. The Irish, we are told, received the English with true Irish hospitality, and they were all, rich and poor, supplied gratuitously with food, books and education. Consequently whole troops and ship loads, "Catervatim . . . classibus advecti," says Aldhelm, of the English youth crossed the Irish Sea. In those days the Irish were most friendly toward the English; the Saxon, not the Celt, was the recipient not the giver, and wherever we read of an Anglo-Saxon of a superior education in the 7th and 8th centuries we may be sure that he must have spent a time in Ireland. With the beginning of the English regime, however, Irishmen had to go abroad for an education.

Under Benignus, Patrick's successor, the attendance at the great School of Armagh so increased that it was necessary to divide it into three parts, one of which was devoted entirely to students of the Anglo-Saxon race. Among those students were some who were destined to be the most eminent teachers and preachers of North Britain. The most famous of all was Aldfrid, King of Northumbria at the end of the 7th century, who, though a king, could not obtain sufficiently trained teachers at home. Some others were Ecgberct (Egbert) who, in the 7th century lived in the Irish cloister of Rathmelsigi, or Mellifont, in the County Louth; Ceadda or Chad, one of the Fathers of the Anglo-Saxon Church, and Oswald, King of Northumbria, who not only learned Christian civilization in Ireland, but even the Irish language to the extent, it is said, of being able to act as interpreter in it. It is in the life of Saint Ecgberct that the often quoted passage occurs, namely, that at the time of the great plague in 664 many of the English nobility and the lower classes received at the Irish schools their daily food, instruction and books without any pay at all.

The most frequented of these early schools were those of Bangor and Clonard, each of which, before the close of the 6th century, is said to have had 3,000 students. It is not to be supposed, however, that in these and similar cases all the students resided in one place. The students were in the habit of migrating from one famous school to another, attracted by the reputation of its professors and the excellence of its equipment. The piety of the Irish saints and scholars was not so narrow as to exclude the pagan authors from their curricula. The monastic code of Columbanus shows that the humanities entered largely into his plan of education, and, judging from his own writings, he seems to have given more attention to classical literature than to philosophy. He left Ireland at the age of 40 and his life on the Continent was one of constant activity, of rough, vigorous, absorbing effort, spent in building monastries, governing them and preaching the Gospel. Consequently no time was left for reading, and he must have acquired his classical education before leaving his native land. The breadth of that education is easily seen to have been far greater than that of his celebrated contemporary, Gregory of Tours, for example. He wrote poems in classic measure in which there are reminiscences of Greek mythology, and he seems to have been familiar especially with the works of Sallust, Seneca, Virgil, Horace and Ovid.

Virgil and Ovid were the pagan authors most read in the Irish schools and not so much for themselves and their poetic beauty as for the light they could throw on ancient history and on the understanding of the Bible. The ease and rapidity with which the Irish scholars acquired an acquaintance with the language and literature of ancient Rome is to be explained, partly at least, by the fact that from the earliest historical times there existed in Ireland a class of men devoted especially to the cult of letters and to the study of their own complicated language and highly intricate verse-forms.

But, what is more important, the Latin authors were not only read with enthusiasm, they were copied with zeal and diligence in the Irish cloisters. Adaptations or translations were made of some of them and others were provided with glosses in Irish; sometimes even the names of lost Latin authors or quotations from their works are known to us through Irish literature. While in other lands monks destroyed manuscripts when pagan or used precious copies of Plautus or Cicero on which to write copies of monastic chronicles, Acts of Councils, or texts of the Vulgate, the Irish monks, appreciating the importance of preserving these monuments of classical antiquity, copied them for posterity. The world owes a debt of gratitude, therefore, to the early Irish scholars for their great services in this direction. Moreover, the rôle they played as the link between antiquity and the later Middle Ages and as the forerunners of the Renaissance has never been adequately treated. But the admiration which the Irish scholars had for the classic authors was not at the sacrifice of the literature of their own country. Practically all the extant manuscripts dealing with the ancient literature and mythology of Ireland were made by scribes attached to cloistral schools, and

whatever is known of the old Irish language is derived from the glosses which they made to Latin texts and from hymns of praise which it was the practice of the Irish Church to sing in Irish as well as in Latin.

In order to provide their students with the tools of learning it was necessary for the Irish scholars to multiply books and collect libraries. Consequently in every monastic school the copying of manuscripts was the principal task of many of its members and regarded as a most meritorious occupation. The Irish scribes were famous not only for the number of manuscripts they transcribed, but also for the wonderful degree of elegance with which they adorned them. The forms of the letters of their alphabet had been introduced into Ireland by British missionaries and are about the same as those found in Latin manuscripts in Romance lands in the 5th and following centuries; the Anglo-Saxons afterward learned their letters from the Irish. Certain monastic schools acquired a veritable reputation for their caligraphy. The position of scribe was held in the greatest honor and importance and the title of scribe is sometimes found added to enhance the celebrity of an abbot or bishop. Saint Columcille was a noted copyist and is said, though perhaps with exaggeration, to have made 300 copies of the psalms or gospels. The same is told of Bishop Dagda, who was called "Scriptor librorum peritissimus," and who passed his nights in copying manuscripts. The scribe of 'Leabhar na hUidhre' (The Book of the Dun Cow), the oldest manuscript in the Irish language, was bishop of Clonmacnois, and another bishop, Find of Kildare, who died in 1060, was closely associated with the writing of the next oldest manuscript, the Book of Leinster. The 'Annals of the Four Masters' name 61 remarkable scribes as having flourished before the year 900, 40 of whom lived between 700 and 800. Somewhere in the Irish laws it is stated that the same penalty was inflicted for killing a bishop, an abbot, or a scribe.

There is no mention of a library in an Irish school before the 11th century, but it is reasonable to suppose that they existed. The learning of the Irish scholars and the references they employ in their writings prove that the range of books they had access to must have been extensive. In the libraries the books rested not on shelves, but were kept in leather satchels which hung on hooks or pegs around the wall. One of the distinguishing marks of the Irish scholar or teacher traveling on the Continent was, besides his strange dress, the leather bag in which he carried his tablets and handbooks. In this way no doubt many valuable manuscripts written in Ireland reached Continental libraries and some of them remain there. Some of these travelers must have owned the books they brought with them, but it is on record that a book called the 'Lebor Gerr' (the Short Book), which was at Monasterboice in 1050, was missing after that date, for a student had feloniously abstracted it from the library and carried it off to the Continent. The number of manuscripts in the Irish hand on the Continent dating from the 7th to the 11th century is about 200, of which some 33 are more or less in the Irish language. In every monastery founded by Irish missionaries on the Continent the library was, next to the church, most important, and those very schools which were either of direct Irish foundation or most strongly under Irish influence, such as Bobbio, Saint Gall, and Reichenau, and which may be regarded as peculiarly representative of Irish culture, were most conspicuous for their libraries.

The flourishing period of the Irish schools and the golden age of Irish civilization synchronizes roughly with the 300 years which are known as the darkest period in the history of European civilization. The waves of barbarism had spread over the entire Continent and it seemed as if they were to engulf it in the abyss of ignorance. Through that dark night Ireland was the principal sanctuary of civilization and the storehouse of classical antiquity and theological learning. Her schools and scholars kept alive the feeble spark of learning and drew the attention of the world to Ireland whose fate it has been so often since to attract attention to her because of her unparalleled sufferings. As Dr. Johnson observed, Ireland "was the school of the West, the quiet habitation of sanctity and literature." She had teachers in every branch of knowledge, sacred and profane, and it was they who planted the foundation of western civilization which we enjoy to-day and on which our times are building.

From the earliest period the Irish scholars, not satisfied with educating their own youth and attracting students from abroad, sent forth disciples who were to scatter her treasures of learning. Many of these scholars were no doubt compelled to take up their books and flee from Ireland because of the Scandinavian invasions, which greatly disturbed the peace of the Irish schools, but it is a mistake to suppose that that was the sole reason of their exodus. Their own energy and the need of trained teachers abroad forced them forward to wider fields of action. From Iona they went to Northumbria, a land which above all owed its Christianity to the Irish and whose monastic and episcopal capital, Lindisfarne, was in direct literary relations with Ireland. They reached the Scandinavian lands and even Iceland. From the end of the 6th to the end of the 9th century, crowds of Irish missionaries went to Gaul, Germany, Italy and Spain and by the end of the 7th and beginning of the 8th century a wide circle of their monasteries had arisen from the mouth of the Meuse and the Rhine to the Rhone and the Alps and even beyond the Rhine in the eastern settlements of the Franks and the Bavarians, among the ruined heaps of Roman settlements and in forests, deserts and mountains where until then only wild beasts found shelter. Ten centuries later some of those abbeys in southern Germany were still called Schottenklöster.

The Irish scholars who first brought Irish culture to the Continent, beginning at the end of the 6th century, came rather as missionaries than as teachers, and they came willingly, impelled only by religious ardor. But there were some great scholars among them. Their countrymen who followed 200 years later came as fugitives seeking rest and protection in the establishments founded by their predecessors. Some of them were mere wanderers and have left only a trace of their presence in the hospices where they lodged as pilgrims. The others settled down as teachers. As their repu-

tation stood very high throughout western Europe (they were spoken of everywhere as «Peritissimi Scotti»), they became teachers of the clergy, the aristocracy, and the common people and counselors of kings and emperors. In a word, they became the schoolmasters of Europe. Every school had its Irish teachers. Charles the Bald brought Scotus Erigena, the founder of scholastic philosophy, to Paris, and Charles the Great surrounded himself with such Irish scholars as Clement and Joseph Scotus, the friend and disciple of Alcuin. There were at least five distinguished Irish scholars named Dungal in France in the time of Charlemagne. In fact, the two first universities of Europe, those of Paris and Pavia, owed their foundation in no small degree to Irish professors.

The number of Irish monks living on the Continent appears to have reached its height in the 11th and 12th centuries. While the names of many of them are known to us, there were, no doubt, some who have not left sufficient evidence to enable us even to connect them with the land of their birth, and others of whom the continental records make no mention whatsoever. It is likely, however, that among anonymous works composed during that period there were some which are to be added to the credit of the Irish scholars. The names of some of the most distinguished among them have already been mentioned. To them may be added Fursey at Lagny, Fredolin at Glarus, Frigidian at Lucca, Livinus who underwent martyrdom in Flanders, Arbogast who occupied the see of Strassburg, Killian, the apostle of Franconia, Saint Fiacre, Saint Virgilius and Cathaldus. Many of these men no doubt had but little originality, and only Scotus Erigena could claim to have opened up a new path in science, yet they were all leaders in the moral and intellectual movement of their time and bearers of a higher culture than was then to be found among the other nations of Europe.

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IRISH SEA, the body of water between England and Ireland. It is connected with the Atlantic Ocean on the north by the North Channel, and on the south by Saint George's Channel. The north shore of Wales and the southwest shore of Scotland are washed by this sea. It is almost circular in form, about 140 miles north and south, and the same east and west. The largest arms of the sea are on the west shore, The Morecambe Bay on the coast of England, and several large fiords. Dublin and Dundalk bays are the most important on the west coast. The only large islands are the Isle of Man in the north, about midway between England and Ireland, and Anglesey off the northwest coast and a part of Wales.

IRISH TERRIER, a rough-coated, strongly built terrier, resembling the Welsh and Scotch terriers. See Dog.

IRISH TEXTS SOCIETY, an organization established in London in 1898. Its object is to promote the study of Irish literature,— that is, of literature in the Irish text. It fosters societies and issues publications to aid the work. By 1914 the society had issued some 12 valuable works.

IRITIS, ī-rī'tĭs, inflammation of the iris, the colored curtain that shows the pupil in its centre. This disease follows several types, depending on the kind and virulence of the causative agent. In the serous form there is an exudation of blood-serums into the space in front of the iris, and more or less fibrinous matter that tends to glue the parts together. Pain shoots through the whole eyeball, and vision is dimmed by the turbid fluid. Persistent adhesions to the lens are formed, causing a permanent distortion of the shape of the pupil. Another form is the plastic, in which the pupil is actually occluded by the fibrinous deposits. Rheumatism and syphilis are the two most frequent causes of the malady, but many constitutional diseases — as gout, diabetes, anæmias and menstrual disorders — may be factors in causing the disturbance, and it may also be secondary to diseases in other parts of the eye, or even in the other eye, as in sympathetic ophthalmia. The treatment consists of dilating the pupil by dropping solutions of some drug, as atropine, into the conjunctival sac, treating the constitutional disease at the seat of the malady, and in relieving the pain by hot fomentations, blood letting and the administration of drugs that are sedative. Syphilitic iritis is a lesion of the third stage of syphilis, where tiny spots called gummata grow in the substance of the iris.

IRKUTSK, ir kootsk, Russia, a provincial government of eastern Siberia, separated from China by the Sayan Mountains. It has an area of 280,499 square miles, and is traversed by the Trans-Siberian Railway. The country is generally mountainous, but produces rye, barley, oats and vegetables. The most important rivers are the Angara, Lena and its tributary the Vitim. Gold, iron and salt figure foremost among the mineral products. Agriculture, cattle-breeding and the transport of goods to and from China are the chief occupations of the people. Pop. 821,000 (one-third exiles and forced colonists), 2.5 to the square mile. The capital city is Irkutsk (q.v.).

IRKUTSK, Asiatic Russia, capital of the government of the same name and the finest city of Siberia, at the confluence of the Angara and the Irkut, 3,385 miles by rail from Moscow. The old city was almost entirely destroyed by fire in 1879, and the modern city is well laid out and well-paved, with wide streets. The winters are very severe in this latitude, but the climate is healthful owing to the elevation. It contains a library, a museum, a theatre, a school of medicine, numerous primary and secondary schools, a meteorological station, a cathedral

with five domes, Lutheran and Roman Catholic churches. It is the residence of the governor-general of eastern Siberia; the seat of an archbishop of the Orthodox Greek Church, and of a national court of appeals. Its manufactures are few and unimportant and are consumed locally. The commerce is of great importance, however, as the city is one of the chief centres of the tea trade and an important point on the Siberian Railway. There is an annual fair in December at which assemble merchants from all parts of Russia. It was founded by Cossacks in 1653, created a town in 1686 and soon developed into the chief centre of the Russo-Chinese tea trade. Pop. 129,700, including about 5,000 exiles.

IRON, Ralph, nom-de-plume of Olive Schreiner (q.v.).

IRON, a common and exceedingly useful metallic element, which has been known and used in the arts for many centuries. Articles made of iron found in the pyramid of Cheops are believed to be 5,000 years old. It occurs in nature in the metallic form, both in meteorites and in certain lavas and volcanic rocks; but the commercial supply is obtained by the reduction of the oxides (or other ores) of the metal, by strongly heating them in a blast furnace with carbon. Iron is grayish in color, with a marked lustre. If cooled slowly from a molten condition it is grayer; if rapidly, it is whiter. It crystallizes in the isometric system, usually in the form of cubes, sometimes as octahedra. The melting point of iron varies to a considerable extent, according to the impurities with which the metal is associated, and also, apparently, according to the physical condition of the iron itself. Pictet gives it as about 2900° F. for iron that is sensibly pure. The specific gravity of the metal also varies to a considerable extent, the determinations ranging from 6.95 to 8.2. The specific gravity of pure iron, at 60° F., may be accepted as 7.85. The specific heat of the metal is about 0.112 at ordinary temperatures, and its coefficient of expansion (on the Fahrenheit scale) is about 0.0000068. Taking the electrical conductivity of mercury (at 32° F.) as unity, the conductivity of iron is about 9.68 at 32° F., and 6.19 at 212° F. Chemically pure iron is not found in commerce, the nearest approach to it being electrolytic iron, which is about 99.95 per cent pure. Even the most carefully made iron of the laboratories has some admixture or alloy which cannot be dislodged. The common commercial forms of iron are wrought iron and cast iron. The former is measurably free of carbon, and is known also as "soft iron" and "malleable iron." It contains a small percentage of slag and minute proportions of phosphorus, sulphur, silicon and manganese. It is obtained from cast iron (pig iron) by first melting and boiling the pig metal, then allowing it to cool till in a pasty condition, and then "puddling" it into balls which are hammered to remove the slag content. Cast iron is the product of the blast furnaces in which iron ores are smelted. It is commonly called pig iron. It contains from 1½ to 4 per cent of carbon in the form of carbide of iron, or of graphite. Where the carbon is in the form of carbide, the iron is hard and brittle; when in the form of graphite the iron is soft and tough. Frequently both forms exist in the same sample in varying proportions. Other common constituents are silicon, from 0.2 up to 18 per cent; phosphorus from 0.02 up to 3 per cent; a minute percentage of sulphur, and manganese, which may run up to 20 per cent, when the compound is called ferro-manganese. On the market pig iron is graded as follows: No. 1, when very gray and with large crystals; No. 2, the same, when with small crystals; No. 3 and No. 4 are closer grained types of No. 1 and No. 2; "mottled," when of white and gray iron mingled. Nos. 1, 2 and 3 are used in foundry work. No. 4 is used generally for puddling into wrought iron and also for the production of heavy castings and for chilled castings. Mottled iron is added to the other types to give density and hardness. Repeated meltings of iron increase its hardness. Iron is the most magnetic substance known. Soft iron is capable of being magnetized very highly when surrounded by a solenoid of wire that is conveying an electrical current; but its magnetization persists only while the electric current is flowing, falling off, upon the cessation of the current, to a value that is practically negligeable. It is upon this property of temporary magnetization that the action of the telephone, the telegraph and many other useful electrical inventions depends. (See MAGNETISM; and for a full discussion of the phenomena of Magnetization, consult Ewing, 'Magnetic Induction in Iron and Other Metals'). Hardened steel, when magnetized by the action of the electric current (or otherwise), retains a large proportion of its magnetism permanently. Iron becomes nonmagnetic at a red heat, but regains its magnetic possibilities upon cooling again. Wrought iron, when pure, is malleable to a certain extent at all temperatures; but it yields to the hammer with special readiness when heated to whiteness, and it may then be forged and welded without difficulty. The presence of any considerable proportion of sulphur or phosphorus makes the metal "short" or brittle. When phosphorus is present in too great a proportion, the iron is brittle in the cold (that is, "cold-short"); while if sulphur is present in excess it is brittle when hot (that is, it is "hot-short").

Chemically, iron is a dyad. It has the symbol Fe (from "ferrum," the Latin name for the metal), and an atomic weight of 56 if O = 16, or 55.6 if H = 1. It forms two basic oxides, (1) ferrous oxide FeO, which gives rise to a series of salts known as "ferrous" salts, and (2) ferric oxide (or ferric sesquioxide), Fe_2O_3, which gives rise to a corresponding series of "ferric" salts. A third oxide, having the formula Fe_3O_4, is also known, which is magnetic, and occurs in nature, either amorphous or crystallized in octahedra, as the mineral "lodestone." This oxide is black in color, and is known as the black oxide, magnetic oxide, or ferroso-ferric oxide. It may be prepared, artificially, by oxidizing iron at a high temperature, either in air or in steam, or by heating carbonate of iron to 650° F., in a current of carbon dioxide. It is not readily attacked by acids or other chemical agents, and for this reason a coating of it is often formed on articles of iron to protect them from further oxidation. The Russia iron that is used for stove-pipes is coated in this way, by a secret process. When in mass, iron does not readily decompose water at ordi-

nary temperatures, though it does so at high temperatures. Finely divided iron decomposes water at 212° F., and at lower temperatures according to some authorities. When in a sufficiently fine state of subdivision, iron will burn in the air or in oxygen, with the formation of a mixture of Fe_2O_3 and Fe_3O_4. Iron forms alloys with many metals, and combines directly with chlorine, bromine, iodine, fluorine, sulphur, carbon, boron, silicon, phosphorus and arsenic. Melted iron dissolves carbon to some extent, and when the molten mass is cooled the carbon is largely deposited in the graphitic form, although a part of it remains in the iron, combined with it in the form of a carbide; and it is believed that the presence of varying quantities of such carbides has much to do with the physical qualities of iron and steel. When melted iron that is saturated with carbon is allowed to cool under great pressure, the carbon is partly deposited in the form of minute crystals of diamond (q.v.); but the manufacture of the diamond by this method has not yet been made commercially practicable.

Ferrous Compounds.— Ferrous oxide, FeO, has not yet been prepared in a state of absolute purity, but it may be obtained approximately pure by reducing ferric oxide, Fe_2O_3, by heating it to 600° F. in a stream of pure hydrogen. It is black in color, and absorbs oxygen with great readiness, passing into the higher oxides. Ferrous sulphate, otherwise known as protosulphate of iron, green vitriol, or copperas, is prepared by dissolving iron wire in dilute sulphuric acid, and crystallizing by evaporation. It has the formula $FeSo_4 + 7H_2O$, and is greenish in color. It is soluble in water, but the solution oxidizes readily, the salt becoming converted into ferric sulphate, $Fe_2(So_4)_3$. Ferrous sulphate is largely used in the manufacture of certain black dyes, in the preparation of writing ink, Prussian blue and other pigments. Ferrous chloride, $FeCl_2$, may be prepared by heating excess of iron wire or iron filings in chlorine, or by passing dry hydrochloric acid gas over hot metallic iron. It crystallizes in white, lustrous, six-sided scales, is deliquescent, and is volatile at a yellow heat. In air it oxidizes readily to a mixture of ferric oxide and ferric chloride. Ferrous carbonate, $FeCo_3$, is an insoluble compound, occurring in nature as "spathic iron ore," and constituting a valuable source of iron. Ferrous sulphide, FeS, is a lustrous black or grayish-black body, which may be prepared by melting sulphur and iron together in the proportion of 56 parts (by weight) of iron to 32 of sulphur, and stirring with a white-hot rod of soft iron. It is insoluble in water, but dissolves readily in dilute acids, with copious liberation of sulphureted hydrogen gas. Ferrous sulphite has been found in some meteorites, as the mineral "triolite." See CHEMICAL ANALYSIS.

Ferric Compounds.— Ferric oxid, Fe_2O_3, occurs native as hematite (q.v.), and it may be prepared artificially by heating ferrous sulphate to redness. Ferric hydrate, $Fe(OH)_3$, is precipitated as a brownish-red powder when ammonia or caustic potash is added to the solution of a ferric salt. Ferric sulphate and ferric chloride are prepared by dissolving this hydrate in sulphuric and hydrochloric acids, respectively. The chloride is used as a disinfectant for sewage, and the sulphate in dyeing cottons. Ferric nitrate is used as a mordant in producing buffs and blacks in dyeing. In general, a ferrous salt, when in solution, is converted into the corresponding ferric salt by the action of oxidizing agents; and the ferric salts, conversely, are reduced to ferrous salts by the action of certain reducing agents. Ferrous salts give a white precipitate with caustic alkalies, and, with potassium ferrocyanide, a light-blue precipitate which quickly turns black. Ferric salts give a reddish-brown precipitate with caustic alkalies, and a deep blue precipitate with potassium ferrocyanide. See CAST IRON; STEEL. Consult Howe, H. M., 'The Metallography of Steel and Cast Iron' (New York 1916); Hudson, O. F., and Bengough, G. D., 'Iron and Steel' (New York 1913); Sauveur, A., 'The Metallography of Iron and Steel' (New York 1912).

IRON, Manufacture of. The metallic products extracted from iron ores for use in the arts are generally divided into three classes: (1) pig or cast iron, (2) wrought iron, and (3) steel.

Although the minerals in which iron occurs are very numerous, the only ones from which the metal can be extracted under economical conditions — that is, the only *ores* of iron — are those in which the iron is present as an oxide, as in magnetites, hematites and limonites, or as a carbonate as in siderites. (See IRON ORES). When carbonate of iron, moreover, is heated to a sufficiently high temperature either at an early stage of the process of manufacture or in a preliminary operation (the calcining of the ore), the carbonic acid which it contains is expelled as a gas and the iron is reduced to the condition of an oxide; hence the operation of extracting metallic iron from its ores always consists in the deoxidation or reduction of iron oxide.

In order to reduce oxide of iron two conditions are essential: (1) contact with a reducing or deoxidizing substance, and (2) a high temperature. By heating iron oxide in contact with some carbonaceous fuel these two necessary conditions are realized, the carbon acting both as the needed fuel and as the needed reducing body, for at a sufficiently high temperature it has a stronger affinity for oxygen than iron and therefore deprives the latter of that element.

Iron ore, however, never consists of pure oxide of iron; even in the richest varieties the iron oxide is associated with at least a small amount of other minerals, generally of an earthy character, such as quartz, clay or limestone, called the *gangue* or *vein stuff*. In the majority of cases the gangue is silicious, that is, made up chiefly of silica or quartz. Silica is *per se* a very infusible compound, but when brought in contact with iron oxide at a high temperature it combines readily with it to form a silicate of iron, a readily fusible substance or slag.

Besides the earthy matters which constitute the gangue, iron ores generally contain other minerals in which are present such elements as phosphorus, sulphur, manganese, etc. See IRON FOUNDING, CHEMISTRY OF.

Finally, if metallic iron be kept in contact with incandescent carbon for a sufficient length of time, a considerable amount of that element will be absorbed by the metal. The conditions

are then said to be carburizing. This affinity of iron for carbon plays a most important part in its metallurgy, chiefly because of the marked influence of carbon upon the melting point of the metal. Pure or rather carbonless iron requires a very high temperature to be melted (about 2,750° F.), necessitating the use of special furnaces and implements capable of producing intense heat. By the introduction of some carbon in the iron, however, its melting point is greatly lowered, from which the important conclusion is to be drawn that if the metallic product of the metallurgical operation be highly carburized it will be produced and maintained in a liquid state much more readily than if it were freer from carbon. If the iron contains but a small amount of carbon and if we lack the means of producing an intense heat, the product of the operation will be pasty and not molten.

The Primitive or Direct Methods.— The simple operation outlined in the preceding paragraphs which consists in heating iron ore in contact with carbonaceous fuel was the one conducted in the direct or primitive methods which for ages were the only ones used for the production of iron and steel. Charcoal was the fuel employed and the simple furnace required, called a forge or bloomery, resembled a smith's forge.

So simple is the operation required for extracting a small mass of malleable iron from some rich ore that it seems highly probable that man became acquainted with the use of iron at a very early period of his existence. A fire accidentally lighted by a primæval man upon the ground where iron ore occurred near the surface would have resulted, under suitable conditions, in the production of some metallic iron. Indeed, the first iron furnaces of which we have any record consisted in a single excavation dug preferably on the side of a hill, facing the prevailing wind, and with suitable openings at the bottom for the necessary draft. Artificial blast was later introduced and the construction of the furnace improved. It will suffice to mention here two representative types of this class of furnaces: (1) the old catalan furnace or forge, and (2) the American bloomery, a modern adaptation of this primitive forge.

The catalan forge takes its name from the province of Catalonia, in Spain, where at one time it contributed a large proportion of the world's production of iron, and where, indeed, it is still in operation, as well as in other localities adjacent to the Pyrenees. In its more modern form it consists of a shallow hearth made up of thick iron plates, with the exception of the back, which generally consists of masonry lined with fire clay, while the bottom is frequently made of a movable block of granite. The blast was undoubtedly at first supplied by crude bellows, but was later produced by a water blower or «trompe.» The furnace is kept filled with charcoal and small lumps of rich iron ore until a pasty mass of metallic iron is obtained weighing some 350 pounds, called a "bloom," and which contains much slag. It is then removed from the furnace and much of the slag expelled by hammering or squeezing.

For many years a direct process known as the American bloomery process was extensively used in those localities of the United States where suitable ore and an abundant supply of charcoal were available. This process does not differ in any essential feature from the catalan method, which has just been described, but in details of furnace construction and in manipulations there are many points of difference between the two methods.

The hearth of the bloomery is kept full with burning charcoal and coarsely pulverized ores until a bloom of iron weighing some 300 or 400 pounds has been produced, an operation which generally requires three hours. The loss of iron is said to be about 20 per cent and the fuel consumption some 2½ tons of charcoal per ton of iron produced.

These methods are called direct because they yield iron by the direct treatment of the ore in a single operation, in contradistinction to the modern methods in which at least two distinct treatments are required for the production of iron and steel, the first operation yielding, as will be seen presently, an impure product called cast iron, which must be refined or purified in order to convert it into iron or steel.

While these methods are now obsolete, having been replaced by the more modern indirect processes, they are still in use in some countries, although only to a very limited extent.

According to James M. Swank, in 1902 and 1903 there were no forges in operation in the United States for the manufacture of blooms and billets from the ore. In 1901 the blooms and billets so made amounted to 2,310 gross tons, against 4,292 tons in 1900, 3,142 tons in 1899, 1,767 tons in 1898, 1,455 tons in 1897, 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, and 2,182 tons in 1892. All the ore blooms produced after 1897 were made by the Chateaugay Ore and Iron Company, of Plattsburgh, N. Y., at its Standish Works, which, however, have been idle since 1902.

The Blast Furnace.— In order to prevent the great waste of iron previously alluded to resulting from the combination of the gangue of the ore with some of the metallic iron, it is necessary to provide a substance with which the silica of the gangue will readily unite, forming with it a fusible slag, and as silica is an acid it is necessary to supply a base to that effect.

Limestone (a carbonate of lime) is the most readily obtainable and cheapest substance for such purpose. It is either burned or calcined in a preliminary operation by which it is converted into lime, the carbonic acid escaping as a gas, or if used raw, as is customary, it is likewise changed to lime at an early stage of the metallurgical operation by the heat to which it is exposed.

The substances which are thus added for the purpose of forming a fusible compound with the gangue of the ore or with other impurities are called fluxes.

The use of fluxes constitutes one of the most important improvements ever introduced in the manufacture of iron, for it made it possible to extract the metal, under economical conditions, from the enormous amount of relatively lean ores which occur in nature, and to do so at a relatively very low cost. Previously to the use of fluxes it was unprofitable to treat ore containing less than some 60 per cent of metallic iron, while with their assistance iron ores with as little as some 25 per cent of iron have been profitably smelted.

With the addition of lime, however, it is no

longer possible to carry on the operation in the very simple furnace or forge previously used, because the resulting slag or silicate of lime is a much more infusible substance than the silicate of iron produced without the addition of lime and a sufficiently high temperature to fuse this lime slag could not be produced in the forge furnace.

The very high temperature required to fuse the lime slag necessitates the use of a very different type of apparatus (a high, chimney-like furnace), together with the necessary appliances for the production of the needed heat; in other words, the reduction of the ore must be carried on in the modern blast furnace. The blast furnace was gradually evolved from the primitive forge or bloomery by a mere increase in height, such furnaces as the "Osmund," the "Stückofen," and the "Blauofen" forming as many steps in this evolution. The exact date of the origin of the blast furnace, that is, of an apparatus in which cast iron alone could be produced — and it might be added with addition of flux — is not positively known but it is generally believed that it originated in the Rhine provinces about the beginning of the 14th century.

The operation conducted in early blast furnaces consisted chiefly in smelting iron ore with the necessary amount of charcoal for fuel and of limestone to flux the gangue of the ore. The waste gases which contained a large amount of carbon monoxide were allowed to escape and to burn freely at the top of the furnace. The molten cast iron was allowed to collect at the bottom of the furnace until a sufficient quantity had accumulated, when it was withdrawn by opening a tap hole at the bottom in the front part of the furnace. The slag was permitted to escape as soon as formed by flowing through an opening and over a stone on one side of the furnace known as the damstone. The blast was at first created by rude bellows, later by blowing cylinders, and finally by steam- or by gas-blowing engines, while no attempt was made at preheating it.

The following improvements introduced in blast furnace practice, outside of mere improvements in construction, marked the most important steps which have led to the modern blast-furnace operations. They are mentioned in a chronological order: (1) Use of coke instead of charcoal introduced by Abraham Darby in 1735; (2) the heating of the blast first proposed by James Beaumont Neilson in 1828; (3) the closing of the top of the furnace and utilization of the waste gases by P. Taylor in 1840; (4) the heating of the hot blast stoves by the waste gases of the furnace successfully accomplished between 1833 and 1845 by Faber du Faur and James Palmer Budd; (5) the cup and cone arrangement for closing the top of the furnace invented by G. Parry in 1850; (6) the use of the waste gases for generating steam by James Palmer Budd in about 1855; (7) regenerative stoves for heating the blast introduced by E. H. Cowper in 1860; (8) use of blast furnace slag for the manufacture of cement; (9) use of gas-blowing engines utilizing the waste gases.

The important and numerous improvements in construction cover every part of the furnace as well as every appliance connected with iron making. To attempt even to mention them would occupy an amount of space which is not here available.

Modern American blast furnaces generally measure from 90 to 100 feet in height and from 20 to 30 feet in diameter at the widest part, while the hearth diameter frequently measures 12 or 15 feet, giving a capacity of from 20,000 to 30,000 cubic feet. The bosh walls which extend from the hearth to the widest part of the furnace are cooled by hollow rings of cast iron or bronze built in sections and inserted into the brick work, and through which water is constantly flowing. The water required for cooling purposes often exceeds 3,000,000 United States gallons in 24 hours. Two down-comers conduct the gas from the top of the furnace to the dust-catchers, from which it is, by means of a gas main, led to the stoves and the boilers or to cleaning and washing towers preliminary to its use in internal combustion blowing engines. Another main leads the blast from the stoves to the furnace. Before connecting with the bustle pipe surrounding the furnace the hot blast main frequently divides in order to better equalize the pressure around the complete circle. Explosion doors are provided at the furnace top, and whenever possible in all pipes and chambers carrying gas.

Blast at the rate of 40,000 to 60,000 cubic feet per minute is forced into the furnace through pipes or "tuyeres," varying between 12 and 20 in number, under a pressure of 10 to 15 pounds per square inch and preheated by its passage through the stoves to a temperature of 1,000 to 1,500° F. The output of these furnaces frequently averages 400 to 600 tons of pig iron in 24 hours and is occasionally considerably greater, the furnace being tapped six times a day and some 75 to 100 tons of iron being obtained at each cast. The tapping hole is frequently opened by means of compressed air drills and closed by means of a tapping hole gun which forces clay into the hole. The fuel consumption varies between 1,500 and 2,000 pounds of coke per ton of pig iron, according to conditions.

The raw materials are conveyed to the top of the furnace by an inclined plane and skip cars, which discharge the raw materials automatically into a receiving hopper provided with a bell and placed over the main hopper. The use of an upper bell acting as a seal while the material is introduced into the furnace prevents the escape and waste of the gases during this operation, resulting in further economy. Uniform distribution of the raw material as it enters the furnace is sometimes promoted by means of rotary or other distributing mechanism.

Modern steam-blowing engines supplying the blast to the furnace are constructed both horizontal and vertical and are generally compound and condensing. They frequently have a capacity of some 30,000 cubic feet of air per minute which they can deliver under a pressure of 25 pounds or more per square inch if needed. Two such engines are generally employed for each furnace.

Internal combustion blowing engines utilizing the waste gases of the furnace were first constructed and put into successful operation at the Cockerill Steel Works at Seraing, Belgium. They are now extensively used. In 1904 the

American metallurgist James Gayley conceived the idea of depriving the blast from its atmospheric moisture before introducing it into the furnace, thereby preventing the strongly endothermic reaction by which steam is decomposed into its elements, from taking place within the furnace, with corresponding loss of heat, and therefore increased consumption of coke. The saving of fuel proved to be considerably greater than was expected from purely theoretical calculations. It amounted to some 20 per cent, while the output of the furnace was increased some 15 to 20 per cent. The method consists in passing the blast through a refrigerating apparatus in which the moisture is solidified. Notwithstanding the remarkable results reported, the method has not been widely adopted, partly at least because of the great cost of the apparatus needed.

The modern stoves employed for heating the blast before it enters the blast furnace consist, roughly stated, in high cylindrical chambers filled with bricks placed some distance apart. The waste gases from the furnace are admitted at one end of these chambers together with sufficient air to burn them, and the hot products of the combustion on their way to the chimney heat the brick work to a very high temperature. After the stove has thus been properly heated, the supply of gas and air is shut off and the cold blast from the engine is admitted. The heat which has been stored up in the brick work is now imparted to the blast, which in this way is highly preheated. After the stove has cooled down to a certain temperature the blast is shut off and the stove is again heated by the waste gases. Modern furnaces are generally provided with four of these stoves, the blast passing in succession through each stove for one hour, while the three others are being heated. With such regenerative system of heating the temperature can readily be maintained at 1,400° F., which results in a considerable economy of fuel in the furnace.

It was for a long time the universal practice, after opening the tap hole, to allow the iron to run into sand molds, prepared for that purpose on the floor in front of the furnace, and this method is still widely used. The metallic mass filling each mold is called a pig, while the metal filling the channels connecting a number of molds is called a sow. The pigs are, of course, fastened to the sow, and, after solidification, must be broken loose, generally with sledge-hammers. When the cast iron is to be used for conversion into steel by the Bessemer process the metal as it flows from the furnace is frequently received in large tanks or "ladles" mounted on wheels, which are afterward taken to the steel mill, where the metal is converted into steel without being allowed to solidify, thus saving the cost of remelting the pig iron. Molten pig iron direct from the blast furnace or from a "mixer" is also used sometimes in the open hearth furnaces. In later years casting machines have been introduced to save the heavy labor connected with the handling of the pigs, and to otherwise expedite the casting operation. Nearly all these devices consist in an endless chain, the links of which are made of small iron molds, which are filled in succession by passing under the stream of molten metal. The chain then carries the partially solidified pigs or "chills" under water to promote their cooling and discharge them automatically on cars, the empty molds returning to the ladle again to be filled, and so on.

In the modern furnace the slag tap hole or "cinder notch" is kept closed, as well as the iron tap hole, being opened only at stated intervals, generally a short time before the casting of the iron. In the latest American practice the slag is generally received in ladles which carry it away to the dumping place, or discharged in a tank of water known as a granulating pit where under the action of a stream of water the molten slag is broken into small fragments, in which form it is suitable for the manufacture of cement and for other uses.

The Products of the Blast Furnace.—Owing to the extremely high temperature at which the operation must be conducted and to prolonged contact between the reduced iron and the incandescent carbonaceous fuel, the conditions in a blast furnace are strongly carburizing, the metal absorbing a large amount of carbon (generally between 3 and 4 per cent). Moreover, owing to the fact that highly carburized iron is much more fusible (melting generally between 2,100° and 2,400° F.) than iron containing little carbon, and to the intense heat of the furnace, the extracted metal, instead of being obtained in a semi-fused, pasty condition, will be perfectly liquid and on account of its high specific gravity will settle at the bottom of the furnace. The slag also will be melted, and being lighter than the iron will float as a separate layer above the metallic bath. The molten slag and the molten iron are withdrawn separately from the furnace through tap holes provided for that purpose at suitable levels, thus effecting their complete separation.

The following table illustrates the rapid increase of the world's production of cast iron since the beginning of the last century, as well as the steadily increasing proportion contributed by the United States.

PRODUCTION IN TONS.

YEARS	Total	United States
1800	825,000	.....
1810	.....	53,908
1830	1,825,000	.....
1850	4,750,000	563,755
1870	12,053,000	1,665,000
1880	18,547,000	2,729,000
1890	27,630,000	4,658,000
1900	40,198,000	14,009,000
1901	40,889,000	16,132,000
1902	45,557,000	18,106,000
1903	47,022,000	18,297,000
1904	45,419,000	16,790,000
1905	54,054,000	23,360,000
1906	59,166,000	25,706,000
1907	60,679,000	26,193,000
1908	48,507,000	16,190,000
1909	61,213,000	26,208,000
1910	66,352,000	27,636,000
1911	63,251,000	24,027,000
1912	75,029,000	30,202,000
1913	80,172,000	31,461,000
1914	62,845,000	23,332,000
1915	64,516,000	29,916,000
1916 (estimated)	75,000,000	39,435,000

This highly carburized iron produced in the blast furnace is called pig iron, or cast iron. Owing principally to the large amount of carbon which it contains, the properties of cast iron are very different from those of wrought iron and steel.

Owing to the intensely reducing conditions

prevailing in a blast furnace, many impurities, such as phosphorus, sulphur, manganese and silicon, which are always present in greater or less amount in the ore, flux and fuel, are partially or wholly reduced to the metallic state and in this condition are retained, in part at least, by the molten cast iron. Cast iron, therefore, is not simply an association of iron and carbon, but contains also varying amounts of the impurities just mentioned.

The Refining of Cast Iron or the Indirect Methods for the Production of Wrought Iron and Steel.— Cast iron is not malleable — it cannot be forged; that is, it cannot be shaped into finished implements by mechanical pressure such as that exerted by hammering, rolling, etc. Cast iron, therefore, can only be used as such for casting purposes, which means that cast iron implements can only be obtained by pouring the molten metal into molds having exactly or very nearly the external shape of the objects we desire to manufacture. Cast iron, moreover, is brittle and lacks both strength and toughness, which further greatly limits its useful application. To produce a metal which is forgeable, which possesses more strength and toughness and other valuable properties absent in cast iron, and, therefore, a much more useful metal, it is necessary to subject cast iron to a refining operation by which it is converted either into steel or into wrought iron.

This indirect method of producing iron and steel is the prevailing modern method, for, in spite of strenuous efforts made to improve the older or direct method, it remains by far the cheaper of the two.

The refining of cast iron or its conversion into wrought iron or steel consists essentially in eliminating a large proportion of the impurities which it contains, especially carbon and silicon. In order to expel these impurities we must bring the cast iron in contact with a substance, either solid or gaseous, possessing more affinity for them than the iron itself, and here again heat is required for such reaction to take place. Oxygen has a very great affinity both for carbon and silicon, and in general for the other impurities present in cast iron, and it is upon this element that we shall depend for the elimination of the impurities. We may for that purpose use either atmospheric oxygen or the oxygen of some oxidizing substances. The oxidizing agents generally used besides atmospheric oxygen are rich iron ore or rich slag from some previous operation, or the slag produced in the refining operation itself. These substances are composed essentially of oxide of iron, which is an oxidizing compound, for it readily parts with some of its oxygen which is taken up by the carbon of the cast iron.

When cast iron in order to be purified is exposed at a sufficiently high temperature to the action of atmospheric oxygen or of some other oxidizing substance, the silicon which it contains combines with some oxygen, being converted to silica. Some of the iron itself will be oxidized and the resulting oxide of iron will in turn enter into combination with the silica to form a fusible silicate of iron or slag.

The carbon present in the cast iron also combines with some atmospheric oxygen, or more frequently with some of the oxygen held by the slag or by some iron ore purposely added, and is converted into carbonic oxide or carbonic acid gas, in which condition it escapes from the furnace. By being deprived of its oxygen the iron ore added in some of these refining operations is reduced to the metallic state and incorporated into the refined metal.

The Products of the Refining of Cast Iron.—As was the case in the treatment of the ore, the nature of the metal resulting from the refining of cast iron will likewise greatly depend upon the temperature at which the operation is conducted. If the temperature be low the refined metal will be obtained in a semi-fused or pasty condition, and will on that account include a relatively large amount of slag, while it will generally be quite free from carbon. In other words, the product of the refining operation conducted under these conditions will be wrought iron, or, if the conditions be made slightly more carburizing, steely iron. These are the conditions prevailing in the old forge refining of cast iron or "finery method," as well as in the more modern puddling process for the manufacture of wrought iron, which methods will be outlined briefly.

The Finery Methods for the Production of Wrought Iron.—When the ironmaster of the 13th or 14th century, through the gradual development in height of its catalan or other forge, so increased the carburizing conditions that he finally obtained a small amount of molten cast iron, he was confronted with the necessity of refining this brittle, unforgeable metal in order to convert it into malleable iron, and he quite naturally endeavored to conduct this refining operation in furnaces similar to the low hearths or forges which for so many centuries had been the only apparatus used for the direct extraction of iron from its ores. In these forges, known as "fineries," the pig iron was melted in contact with charcoal and under the oxidizing influence of a blast issuing from a single tuyere. While the details of the finery operation and of the furnace differed much in various countries, and even in different sections of the same country, their essential features were identical. Four of these processes attained especial prominence and have not been entirely driven out of existence by the puddling process nor later by the Bessemer process; they are the Walloon process as still conducted in Sweden, the Franche Comté process, the Lancashire process still used in England, the United States and some other countries, and the South Wales process which was for many years extensively used in South Wales for the production of iron plates for tinning. In recent years, however, soft Bessemer and open hearth steel have taken the place of wrought iron for such purpose and this once flourishing industry is now quite, if not altogether, extinct.

These charcoal hearths or fineries are also frequently used for the remelting of iron and steel scrap resulting in the production of wrought iron of high quality. The operation consists in filling the hearth with charcoal, upon which the scrap is placed and covered with additional charcoal and the charge melted. The slag produced in this operation is very basic and therefore promotes the removal of the phosphorus and sulphur which are eliminated to a notable extent.

The iron manufactured or remelted in these hearths is mainly used for the manufacture of plates, sheets, skelp rods, etc., which are used

in the manufacture of boiler tubes, boilers, screws, rivets, wire, etc.

According to J. M. Swank, the iron blooms produced in forges from pig iron and scrap in 1903, in the United States, and which were for sale and not for the consumption of the makers, amounted to 9,940 tons, against 12,002 tons in 1902, 8,237 tons in 1901, 8,655 tons in 1900, 9,932 tons in 1899, 6,345 tons in 1898, 7,159 tons in 1897 and 6,494 tons in 1896. All the pig and scrap blooms made in forges from 1895 to 1903, and for sale, were made in New York, Pennsylvania and Maryland.

The Puddling Process.—The finery methods described in the preceding paragraphs were the only ones available for the conversion of cast iron into wrought iron until an Englishman by the name of Henry Cort invented the puddling process in the year 1784, a date which marks a very important epoch in the metallurgy of iron. It has been seen that in the finery processes the pig iron is heated in contact with solid fuel, and this necessitates the use of charcoal, because this fuel alone is sufficiently pure to yield wrought iron of good quality. If the attempt were made to use inferior fuels, such as coal or coke, it would be found that the iron absorbed so much impurity from the coal, notably sulphur, as to be of inferior quality. The necessity of using such an expensive fuel as charcoal, and a large amount of it, is a serious limitation of the finery processes, greatly increasing the price of the iron. To make the use of more impure but cheaper fuel possible, Cort proposed to conduct the refining of the pig iron in the hearth of a reverberatory furnace, that is, out of contact with the fuel itself, thereby preventing the contamination of the iron by the impurities of the fuel. In a reverberatory furnace the fuel is burned in a separate fireplace, the substance to be treated coming in contact only with the flames and gases resulting from the combustion of the fuel. In the puddling furnace, moreover, the labor required per ton of iron was greatly reduced and it was possible to treat in one operation a considerably greater amount of pig iron.

The puddling operation as originally conducted by Cort and others is now known as the "dry puddling process," while the more modern method of conducting the operation, which involves some important alteration of the original method, is known as the "wet" or "pig boiling" puddling process. Only the latter will here be described.

The Wet or Pig Boiling Puddling Process.—In the original or dry puddling process, while the oxidation of the carbon, silicon and other impurities was brought about to a certain extent by the oxide of iron formed during the operation, we depended mostly for their elimination upon the oxygen of the air, and this necessitates for reasons which cannot here be explained the use of white or refined pig iron. The modification about to be described was introduced into the puddling process for the purpose of making it possible to treat gray cast iron at once in the reverberatory furnace, doing away with the preliminary refining operation and otherwise hastening the process. It is said to have been first used by Joseph Hall, of the firm of Barrows and Hall, of Tipton, England, about the year 1830.

The modern puddling furnace employed for the conduct of the pig boiling process resembles in its general lines the earlier puddling furnaces, the essential difference being in the nature of the lining of the hearth. The bottom of the hearth and the sides are made of iron plates which are protected by a thick layer of oxide of iron, called the "fettling" of the furnace. The substances used for fettling purposes consist of pure hematites (ferric oxide) crushed or ground to the desired size, and of slags or scales obtained in the production or working of iron, and which are very rich in oxide of iron, such as roasted tap cinder or "bull dog." The bottom is sometimes made of pure iron oxide resulting from the oxidizing of iron or steel scrap in the furnace itself. This oxide lining, as previously stated, plays an important part in the operation by giving up a part of its oxygen to the carbon and other impurities present in the pig iron, thus greatly hastening their removal, and in permitting the formation of a slag of suitable composition. From 300 to 500 pounds of gray pig iron are generally treated in these furnaces, frequently with the addition of some puddle mill or hammer scale, which consists of magnetic oxide of iron and which therefore helps in oxidizing the impurities. The pig iron is now melted and becomes liquid without assuming the pasty condition characteristic of white pig iron. During the melting down period a large proportion of the silicon is oxidized and some of the carbon chiefly by the oxygen of the air. Some iron also is oxidized and slag formed, while owing to the removal of silicon the remaining carbon passes to the combined condition.

The bath is constantly stirred or "rabbled" so as to promote contact of all portions with the oxidizing lining and with the iron oxide of the slag, thus hastening the oxidation of the silicon and carbon. As the carbon is expelled the mass becomes pasty, the metal having now "come to nature." The spongy mass of wrought iron is then divided into balls weighing some 60 pounds, which are withdrawn from the furnace and worked in the usual way.

The whole operation lasts usually about 1½ hours, but may be longer or shorter, according to the purity of the metal treated. The loss varies from 5 to 10 per cent, being chiefly dependent upon the amount of impurity in the pig iron. According to Turner, the consumption of coal in the puddling furnace per ton of puddled bars amounts generally to about 2,600 pounds. The following interesting comments are from Prof. H. M. Howe:

"While the yearly production of wrought iron in the United States more than doubled between 1870 and 1890, yet since the latter year it has shrunk very much, probably nearly to that of 1870; and between 1870 and 1900 the proportion which the production of wrought iron bears to that of steel diminished very greatly. Of the combined annual production of wrought iron and steel in the United States that of wrought iron formed 95 per cent in 1870, 63 per cent in 1880, 37 per cent in 1890, and probably not far from 15 per cent in 1899. The corresponding numbers for Great Britain are 34 per cent for 1890 and 19 per cent for 1899, and 16 per cent for 1901. In the year 1899 the average number of British puddling furnaces in operation is reported as 1,149 out of a total of 1,320 in existence. Thus in 19

years the position of wrought iron changed from that of the chief product to one of secondary importance.»

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IRON AGE, (1) in mythology, the last of the four great ages of the world, supposed to be characterized by abounding oppression, vice, and misery. (2) In archæology, an age, the third in succession, in which weapons and many other implements began to be made of iron, stone having been used for these purposes in the first, and bronze in the second. See ARCHÆOLOGY.

IRON CAP. See SECONDARY ENRICHMENT.

IRON CROSS (*Eisernes Kreuz*), Prussian military decoration, instituted 10 March 1813, by Frederick William III, and conferred for distinguished services in war. The decoration is an iron Maltese cross with silver mounting and is worn at the neck or at the buttonhole. The grand cross, a cross of double the size, is presented exclusively to the upper officers for the gaining of a decisive battle. The order lapsed in the middle of the 19th century but was revived in 1870. In the great war beginning in August 1914 very great numbers of men in the German army and navy received the Iron Cross from Emperor William II.

IRON CROWN, the crown of the ancient Longobardian kings, given, according to an unauthenticated tradition, by Pope Gregory the Great to Queen Theodolinda and preserved till lately in the cathedral of Monza. Henry, in 1311, is the first German emperor known to have worn it. It was removed by the Austrians to Vienna after 1859, but was presented to the King of Italy in 1866. The outer part of the crown consists of a golden hoop, with enameled flowers and precious stones, in form like an ancient diadem, within which is a thin plate or fillet of iron, which is declared by tradition to have been hammered from one of the nails of the true cross. Consult Bombelli, 'Storia della corona ferrea' (Florence 1870) and Hodgkin, Thomas, 'Italy and her Invaders' (Vol. VI, Oxford 1880).

IRON FOUNDING, Chemistry of. Chemistry is the science which deals with the composition of material things the chemistry of iron founding or iron casting is the science which deals with the composition of cast iron. Cast iron implies by that title a quality of iron which can be melted and poured into molds and which will take the shape of the molds. The three properties which make cast iron valuable for casting are fluidity, low shrinkage, and mutability of hardness. Pure iron does not have these essential characteristics, consequently the casting properties of cast iron must be due to other substances present with the iron. The chemistry of iron founding must therefore deal with these substances and their reactions in making iron a casting metal. The substances which occur with iron are carbon, silicon, phosphorus, sulphur, and manganese, and each of these has a decided effect upon the iron with which it is combined.

CARBON.

Carbon.— Carbon is the controlling element; in fact, iron could not be cast iron without carbon. Iron as it comes from the blast furnace, in the form known as pig iron, contains from 3 to 4½ per cent carbon. Cast iron as it comes from the cupola generally retains from 3 to 4 per cent carbon; special grades sometimes contain as low as 2¼ per cent and as high as 4¼ per cent.

Condition of Carbon in Cast Iron.— Chemically, all the carbon which does not dissolve when the iron is placed in a certain strength of nitric acid is classed as Free Carbon, while the carbon which dissolves in this acid is designated as Combined Carbon.

Free Carbon.— Free carbon occurs as pure carbon interspersed in appreciable-sized particles between the crystals of iron. While the iron is in a molten condition it will hold in combination up to about 4.6 per cent of carbon, which is the saturation point. As the temperature lowers the saturation point drops, and the excess of carbon separates out. Chromium and manganese in the iron raise its saturation point for carbon; silicon reduces it. Free carbon is subdivided according to its structure and mode of formation into Graphitic Carbon and Annealing Carbon.

Graphitic Carbon.— Graphitic carbon is the crystalline or flaky form of carbon existing in all soft pig and cast iron which has been allowed to cool slowly from a molten condition.

Annealing Carbon.—Annealing carbon is an amorphous modification of graphite which is developed in white iron by continued annealing at a high temperature.

The difference between Graphitic and Annealing Carbon is a physical one and is due to the mode of formation.

Combined Carbon.— Combined carbon exists in cast iron in two forms, Hardening Carbon and Carbide Carbon. Neither is visible to the naked eye, but each gives to iron a definite physical structure which is discernible under the microscope. Chemically, they may be separated by treating the iron for a long period with a weak non-oxidizing acid in a non-oxidizing atmosphere.

Hardening Carbon.— Carbon is held in the hardening condition by rapidly cooling iron from a high temperature. The condition in which it remains is considered that of solution. (See ALLOYS). This alloy of iron and carbon is known as Austenite. The limit of carbon which will remain in perfect alloy is 0.89 per cent.

Carbide Carbon.— Carbide carbon is the carbon which exists in the carbide of iron Fe_3C, also known as Cementite.

Factors Controlling the Condition of the Carbon.— There are three factors which control the condition of carbon in cast iron. First, the percentage of carbon in the iron; second, the rate at which the iron cools; third, the percentage of other elements present with the carbon in the iron. Thus: (1) The more carbon there is present in molten cast iron when it begins to cool, the greater will be the percentage of carbon which will separate out in the free condition during cooling. For example —a 4 per cent carbon iron would contain a greater percentage of free carbon than a 3 per

cent carbon iron, provided both were cooled under similar conditions and carried the same amount of other elements. (2) The slower cast iron cools the greater will be the percentage of carbon present in the free condition, and conversely, the faster an iron is cooled, the greater will be the proportion of the carbon present in the combined condition. If a portion of molten cast iron of a correct composition is poured into cold water the carbon will be retained in the combined condition; if another portion of the same iron is cooled very slowly, all the carbon will separate out into the free condition. (3) The condition of the carbon in cast iron is controlled by the percentage of carbon present and the rate of cooling, consequently any elements which affect these two reactions will affect the relation of the free to the combined carbon. Silicon, sulphur, phosphorus and manganese take a prominent part in one or both of these reactions and consequently exert an important influence upon the condition of the carbon. (This is discussed later under the individual elements).

Effect of Carbon on the Physical Properties of Cast Iron.— Free carbon makes iron soft and is instrumental in prolonging the fluidity, decreasing shrinkage and regulating strength. Hardening carbon and carbide carbon increase the hardness and strength of cast iron; they prevent the decrease in shrinkage which would occur if their carbon was present in the free condition; they lower the melting point of cast iron.

Action of Carbon in Affecting the Physical Properties of Cast Iron.—As cast iron cools from a molten condition the carbon separates out as free carbon, unites with the iron as carbide carbon, and is retained in the form of hardening carbon. Cast iron in the molten state is a solution of carbon in iron; as the temperature decreases the ability of the iron to hold carbon in solution decreases, and the carbon begins to separate out as graphitic carbon. Heat rendered latent in the solution of the carbon in the iron will be given up when the carbon separates out from the iron, and this evolved heat will prolong fluidity and consequently will give a longer time for the separation of free carbon, thus increasing the softness and decreasing the shrinkage of the iron.

When cast iron cools, the carbon which did not separate out as free carbon tends to unite with the iron as carbide carbon in the compound Fe_3C. This occurs while the iron is passing through the zone of temperature in the neighborhood of 1300° F. The remainder of the carbon, which neither separates as free carbon nor unites with the iron as carbide carbon, remains present as hardening carbon.

Silicon.

Silicon.— Silicon is of value to cast iron on account of its influence upon the carbon. Silicon of itself would add no beneficial quality as its effects are indirect and through the carbon. Pig iron generally contains from two-tenths of 1 per cent to 12 per cent silicon. The lower silicon grades are hard charcoal, basic, or oil bessemer irons, while the extremely high silicon irons are special softeners made to mix with other irons to increase the percentage of silicon. A low proportion of silicon gives a hard cast iron of white fracture: a high proportion gives a soft iron of grey fracture. Cast iron carries from 0.4 of 1 per cent to 1 per cent silicon for chilled work and from 1 to 3 per cent for different grades of grey iron.

Condition of Silicon in Cast Iron.— The condition of silicon in cast iron has not been fully determined. Certain silicides of iron have been separated from cast iron, but their composition is so indefinite and they are so easily broken up that their condition exerts no important influence upon cast iron.

Effect of Silicon on the Physical Properties of Cast Iron.— Silicon through its action on the carbon softens cast iron, reduces its shrinkage, increases its fluidity, and regulates its strength.

The effect of silicon as a softener is limited, and when too much silicon is present its softening action ceases and it begins to harden iron. The same is true with regard to its effect on fluidity and strength. Cast iron with 3½ per cent silicon will retain almost no carbon in combination, consequently any silicon in excess of this amount exerts a direct effect upon the iron and renders it unfit for use as a cast product.

Action of Silicon on Carbon.— The importance of the action of silicon on carbon is due to the fact that silicon reduces the solubility of iron for carbon. An iron containing silicon will dissolve less carbon than an iron containing none. At a given temperature, then, the more silicon an iron contains the less carbon will the iron retain in the dissolved or hardening condition, consequently when an iron cools from a high temperature the amount of carbon that will separate out from solution is regulated by the amount of silicon present. The higher the silicon the less carbon will the iron hold in solution, and the more will separate out as free carbon.

Phosphorus.

Phosphorus.— Phosphorus confers both beneficial and harmful properties on cast iron. Cast iron generally contains from 0.2 to 1.5 per cent phosphorus, but on account of its injurious effect it should be kept below 1 per cent for light thin castings, and below 0.5 per cent in heavy castings.

Condition of Phosphorus in Cast Iron.— Up to a proportion of 1.7 per cent, phosphorus dissolves in iron forming an alloy. Above this proportion free iron phosphide is formed, and at 15.6 per cent of phosphorus, the entire mass of the iron has been converted into iron phosphide. Between the two percentages named, the grains of the iron-phosphorus alloy become coated with a pellicle of iron phosphide, decidedly weakening its structure. The presence of carbon also in the iron militates against the presence of the contained phosphorus, and may eject it altogether; so that it is common to find both free iron carbide and free iron phosphide in a sample of cast iron. A percentage of 0.89 carbon is compatible with the maximum of 1.7 per cent of phosphorus in alloy with the iron. In strong castings the proportion of phosphorus is held down to 0.4 per cent; in ordinary castings 0.7 per cent is allowed.

Effect of Phosphorus on the Properties of Cast Iron.— Phosphorus makes iron fluid, or at least prolongs the fluidity, and thus aids the iron in taking the exact form of the mold. It

makes iron weak, brittle and liable to break under shocks. It is advantageous in light, thin castings where fluidity and exactness of outline are important and where strength can be neglected. It is very detrimental in large irregular-shape castings, especially where strength is required.

Action of Phosphorus on Cast Iron.— Phosphorus by prolonging the fluidity of the iron gives the graphite a further opportunity to separate and thus tends to reduce shrinkage. By prolonging the iron in a plastic condition just after it sets, phosphorus allows the separating graphite to force the iron into the minutest corners of the mold. The phosphorus prolongs the cooling of the iron as it crystallizes out and thus allows it to separate into larger crystals, which weakens the iron and causes it to be brittle. When phosphorus is present in large quantities it forms a eutectic with the iron which fills up the crevices between the particles which have previously solidified. When the eutectic solidifies later it causes strains in the iron which makes it short and liable to break under shock.

SULPHUR.

Sulphur.— Sulphur acts in two ways in cast iron. First through the carbon and second by uniting directly with the iron. On account of its injurious action sulphur is generally kept below 0.15 of 1 per cent, and for light work below 0.08 of 1 per cent.

Condition of Sulphur in Cast Iron.— Sulphur exists in cold cast iron as a sulphide of iron, as a compound of this sulphide with iron, and when manganese is present, as a sulphide of manganese. In molten cast iron it is probably dissolved as gaseous sulphur.

Effect of Sulphur on the Properties of Cast Iron.— Sulphur makes iron hard, red short, weak and liable to contain blow holes. Its only beneficial effect is to give a hard wearing quality to iron subjected to frictional wear.

Action of Sulphur on Cast Iron.— Sulphur by shortening the time of cooling of cast iron, prevents the separation of graphitic carbon. The carbon which has not been able to separate as free carbon remains in the combined condition, and consequently sulphur tends to harden the iron. It is moreover heavily affected by the content of silicon. It is customary with iron founders to add silicon to iron with a sulphur content above the normal, with the effect of releasing the carbon which the sulphur retains in the iron.

When cast iron solidifies sulphur is still in a gaseous condition and surrounds each particle of iron with a covering of gaseous sulphur. When the iron is sufficiently cold, the sulphur solidifies, or unites with the iron as a sulphide of iron. In this condition it occupies less space than in the gaseous condition and thus leaves the crystals surrounded by minute spaces which makes the iron very brittle and weak.

MANGANESE.

Manganese.— Manganese acts in two opposite ways on cast iron. It increases the power of the iron to hold carbon in solution and consequently tends to increase the combined carbon and hardness. It unites with the sulphur and forms a sulphide of manganese which separates out before the iron sets and thus prevents the sulphur from exerting a hardening effect. Pig iron contains from 0.2 of 1 per cent to 3½ per cent manganese, while cast iron ordinarily runs from 0.1 of 1 per cent to 1 per cent in manganese. Owing to its affinity for carbon, manganese is also found as iron-manganese carbide. To this same affinity must be ascribed the fact that iron with a high manganese content has as a rule a high carbon content. The carbide assumes a very hard granular form causing hard spots in the iron very difficult to machine.

Condition of Manganese in Cast Iron.— Manganese exists in three conditions in cast iron. In the molten condition it tends to unite with the sulphur as manganese sulphide. As the iron cools through the critical temperature the manganese unites with the carbon to form a carbide Mn_3C. Any manganese not so united alloys with the iron.

Effect of Manganese on the Properties of Cast Iron.— Manganese by its action on the carbon tends to harden cast iron, while its effect on sulphur tends to soften cast iron. Whether the hardening effect with the carbon or the softening effect on the sulphur predominates depends upon the relative amount of manganese and sulphur present.

Action of Manganese on Cast Iron.— Manganese unites with the sulphur and forms a manganese sulphide at a temperature above the solidifying temperature of cast iron. Consequently this manganese sulphide has no more detrimental effect on the iron than so many small particles of any neutral impurity, and eventually reaches the slag, unless ferrous oxide is present. In this case it is apt to form a layer between the molten iron and the slag. Manganese therefore prevents the bad effect of the sulphur, and hence in the case of high sulphur irons it acts as a softener. However, the combination of manganese and sulphur takes place only at very high temperatures, and then but slowly, so that sufficient time must be allowed for such clearing out of the sulphur. The manganese in excess of that which unites with the sulphur unites with the carbon to form a carbide Mn_3C. This carbide hardens the iron, for it of itself is an intensely hard substance.

Consult Keep, W. J., 'Cast Iron' (New York 1902); Kirk, E., 'A Practical Treatise on Foundry Irons' (Philadelphia 1911); Moldenke, R., 'The Principles of Iron Founding' (New York 1916).

IRON GATES (Turkish, *Demir-Kapu*), a narrow gorge, about two miles long, in the Transylvanian Alps through which the Danube flows. It is situated near Orsova, just without the border of Hungary. In the last decade of the 19th century the obstructions to navigation at this point were removed by great blasting operations. The current is very rapid through the gorge and navigation is rendered dangerous in consequence.

IRON AND STEEL INDUSTRY IN THE UNITED STATES. It is not known whether the mound-builders or other contemporaneous inhabitants of the United States were acquainted with the use and manufacture of iron, nor is it on record that any iron implements were ever found in the ruins of the ancient civilization of America. It is stated by

Prescott that iron was not used by the natives of Mexico and Peru at the time of the conquest although at that time they were the most advanced in all the arts of civilization. It is likewise believed that at the time of the discovery of America the Indians were unacquainted with the use of iron. Hammered implements and ornaments of meteoric iron, however, have been discovered notably in the ancient mounts of Ohio.

Iron ore was first discovered within the limits of the United States in 1585 in North Carolina by an expedition organized by Sir Walter Raleigh but no use was made of it at the time. The first export of iron took place in 1608 when in April of that year a boat of the Virginia Company of London (the first permanent English colony) loaded with iron ore and other products of the soil sailed for England from Jamestown, Va.

The first iron works in the United States were erected at Falling Creek, Va. (near Richmond), in 1619 by the Virginia Company, but Indian troubles and the revocation of the charter of the company in 1624 caused this first attempt at manufacturing iron in the States to end in disaster. Doubt even exists as to iron having ever been made at these works. Nor is it known whether they included a blast furnace and refinery or only a bloomary. The first successful Iron Works in the United States were located on the Saugus River, near Lynn, Mass., where iron ore had been discovered in 1629. The works were built in 1643 by John Winthrop, Jr. (the son of the governor), and 10 other Englishmen forming the "Company of Undertakers for the Iron Works." They probably included a blast furnace, and seven to eight tons of pig-iron were produced weekly. It is believed that they were discontinued in about 1688 owing to lawsuits over the overflow of water and unpopularity caused by a fear that they would cause a scarcity of timber. It is at these works that the first iron casting was made consisting in a small iron pot. The pot is still in the possession of some of the descendants of one of the owners of the land on which the works were erected.

In 1647 Joseph Jenks built at the Lynn plant a forge for the "manufacture of scythes and other edge tools," and it is at these works also that in 1652 were made the dies for the first silver pieces coined in New England at the mint established that year at Boston, as well as, for the city of Boston, the first engine made in America.

In about 1646 the Lynn Company built a furnace and a forge at Braintree, some 10 miles south of Boston, where, however, operations ceased in 1653 for lack of suitable iron ore.

In 1652 iron works were built near Taunton, Mass., being put in operation in 1656. Bar iron was made directly from the ore in a bloomary. These works were still active in 1865, at which time they consisted of four forge fires, two hammers and two water-wheels. They were soon after abandoned and dismantled.

Other iron enterprises in Massachusetts followed those that have been mentioned, notably at Topsfield, near Ipswich, in 1677, at Boxford in 1680, on Strong Brook and at other places near Taunton in 1696. It is apparent, therefore, that Massachusetts remained for over 100 years after its settlement the chief centre of iron manufacture in the United States. The works consisted chiefly of bloomaries although they included some blast furnaces for the direct production of castings but not for the making of pig iron. The iron was derived from bog and pond ores, charcoal was used as fuel and water power utilized.

The names of the New England settlers Winthrop, Jenks and Leonard and of some of their descendants are closely associated with these early enterprises.

The first iron works in Connecticut were erected at New Haven in 1658 by Thomas Clarke, John Winthrop and others. They consisted of a blast furnace and a refinery forge.

In Rhode Island iron was made at Pawtucket in 1675, that is soon after its settlement (1636) where a forge was erected by Joseph Jenks, Jr.

There is no evidence of iron having been made in Maine, New Hampshire or Vermont before the 18th century. During the latter part of the 18th century, however, numerous forges were in operation in New England and its iron industry was very prosperous.

Iron works were built in New Jersey at Tinton Falls, near Shrewsbury, in 1682 by Henry Leonard of Massachusetts, where magnetic iron ores from northern New Jersey were probably smelted. Other works were erected near Morristown and at several other places between 1710 and 1770. A forge at Troy was still in operation in 1860. These works consisted chiefly of bloomaries.

During the latter part of the 17th century and the beginning of the 18th, Massachusetts and New Jersey were the chief producers of iron. In the latter State the manufacturing conditions were exceptionally favorable because of its deposits of rich magnetic ores, its wooded hills and its many mountain streams. Bloomaries were chiefly used and in some of them the blast was created by the trompe or water blast. During the second half of the 18th century many blast furnaces and other iron works were built in New Jersey and its iron industry was very active.

In 1802 there were 150 forges in New Jersey, yielding about 3,000 tons of iron yearly, while pig iron was made in 13 blast furnaces. Four rolling and slitting mills were also in operation, chiefly for the manufacture of nails. The last charcoal blast furnace was built in 1862, but was soon abandoned, anthracite having by this time replaced charcoal as a blast furnace fuel. Bloomaries no longer exist in New Jersey, but in 1890 several forges were still in operation for the manufacture of blooms from pig iron and scrap.

Not until 1692 do we find any mention of iron having been manufactured in Pennsylvania. In 1717 a forge was erected on Manatawny Creek in Berks County, and another known as the Coventry Forge on French Creek in Chester County. The latter was still active in 1856 making blooms from pig iron, but was dismantled in 1870. The ruins of this early Pennsylvania forge still exist. In about 1720 the Colebrookdale furnace in the township of that name on Ironstone Creek, north of Pottstown in Berks County, was built and was still in operation in 1793. The Durham furnace on Durham Creek in Bucks County was erected in 1727. This furnace was between 35 and 40 feet

square and about 30 feet high. It made from the start pig iron to be converted into bar iron. It remained active until 1791 and was torn down in 1829. In 1848 and 1851 two furnaces were built at Durham using anthracite as fuel. They were torn down in 1874 and replaced by a large blast furnace. Many forges and furnaces were built in Pennsylvania during the first half of the 18th century, notably in the Schuylkill Valley and in the eastern portion of the State. Among these may be mentioned the Glasgow Forge near Pottstown, the Spring Forge in Berks County, the Green Lane Forge 20 miles above Norristown, the Pine Forge and the Mount Pleasant Furnace, respectively, 5 and 13 miles above Pottstown, the Oley Forge on the Manatawny, the Reading Furnace and the Warwick Furnace both on French Creek. The Warwick Furnace remained in operation until 1867. Guns were cast at this furnace during the revolution for the Continental army. The Vincent Steel Works were erected on French Creek in 1750, and the Windsor forges on Conestoga Creek near Churchtown in about 1742. The latter were still in operation in 1848. The Mount Joy Forge at the mouth of East Valley Creek was in operation in 1751, when it was using pig iron supplied by the Warwick Furnace. The Valley Forge and other mills were built soon after the Revolutionary War near the Mount Joy Forge. They were abandoned in 1824. To complete this short sketch of early iron making in Pennsylvania, the following works should be mentioned. A forge built in 1740 on Hay Creek, the Hopewell Furnace on French Creek which continued its operations until 1883, the Roxborough, later known as the Berkshire Furnace, built at Heidelberg in 1760, a rolling and slitting mill and a nail factory at Birdboro about the time of the revolution, the Charming Forge in Berks County in 1749 which remained active until 1887, the Moselen Forge in Berks County, the Gulf Forge in Montgomery County, the Union and Pottsgrove forges in the Schuylkill Valley, the Oley Furnace built in 1765 north of Reading and which remained in operation until 1886, a forge on Crum Creek near Chester erected in 1742, the Sarum Iron Works in Delaware County, built in 1742, to which was later added a rolling and slitting mill.

Two steel furnaces for the production of blister steel were in operation in 1750 in Philadelphia.

After the early failure at manufacturing iron in Virginia, already noted in these columns, no further efforts were made until nearly 100 years later. In 1716 a furnace was in operation near Rappahannock, while in 1732 a blast furnace 30 miles southwest of Fredericksburg was making 20 tons of iron per week, and blast furnaces were in operation in Spottsylvania County and in Stafford County, the latter furnace, called the Accokeek Furnace, using iron ore from "England's Iron Mines," so called from the name of the manager but situated on land owned by the father of George Washington. At the same period an air furnace, the Spotswood's, for the melting of pig iron and the casting of sundry articles, was in operation at Massaponax.

During the second half of the 18th century many other furnaces and forges were built in the Valley of Virginia. It is stated that previous to 1856 at least 88 charcoal furnaces, 59 forges and bloomaries and 12 rolling mills had been built in the Virginias, seven of the rolling mills being located near Wheeling. The charcoal furnaces, of which several are in existence to-day, were stone constructions built against a bank at the same level as the tunnel-head; they used a cold blast created by water power and wooden tubs.

In later years the manufacture of iron in the Virginias was given a fresh impetus through the discovery of valuable iron ore deposits and the manufacture of excellent blast furnace coke from Pocahontas coal.

The first iron works in Maryland, consisting probably of bloomaries, are believed to have been erected in 1716 in Cecil County on Chesapeake Bay.

In 1722 the Principio Company, owners of the Accokeek Furnace in Virginia, built a furnace on Principio Creek in Cecil County, and in 1744 the Kingsbury Furnace in Baltimore County. The Lancashire Furnace situated close by was purchased by the company in 1751 which thus became the owner of four furnaces and two forges. It is said that one-half of the pig iron exported to England before the revolution was made by these furnaces. Captain Washington and later his son, Lawrence, a half brother to George Washington, were part owners of these works. They were confiscated as British property in 1780. Iron works have never ceased to be in operation at Principio and North East. A charcoal furnace was built in 1837 and it is here also that the important works of the McCullough Iron Company are situated.

Between 1723 and 1730 the Baltimore Company built a blast furnace near Gwynn's fall and the Mount Royal Forge at Jones's Falls. A furnace and two forges were constructed at an early date at the head of Gunpowder River.

During the latter part of the 18th century many other iron works were erected in Maryland.

It is believed that iron works were built in Delaware, in New Castle County, previous to 1730. Emmanuel Swedenborg in his 'De Ferro,' printed in 1734, mentions the existence of iron works on the Christiana River built by Sir William Keith. One of the furnaces was known as the Abbington furnace. In 1763 a furnace was erected near Concord in Sussex County, and in 1769 a forge on Nanticoke River. The Pine Grove Furnace was built in 1764 near Concord and the Unity Forge on the Nanticoke River in 1771. The latter remained active until 1816. A rolling mill was in operation in Delaware in 1787 near Wilmington. Other iron works were built at later dates, but no iron or steel is at present manufactured in the State of Delaware.

Iron works were probably built in North Carolina previous to 1730 near the coast in the neighborhood of bog-ore deposits. It is certain that iron works were in operation in that State before the revolution. The following may be mentioned: furnace and iron works on Deep run, iron works in Guilford County, including the Troublesome Forge, the Buffalo Creek Furnace, two furnaces, four forges and two bloomaries in Lincoln County, the Union Forge in Stokes County, etc. Practically all these

works as well as those built later have now been abandoned.

Connecticut is believed to have been the first of the colonies to make steel. This was in 1728 in Hartford County and undoubtedly by the cementation process.

A bloomary was erected in New York State in 1740 in Columbia County on Ancram Creek, and to this was added in 1750 a blast furnace and a forge. The Sterling Iron Works were built about 1751 in Orange County. They are said to have made the anchors for the United States frigate, *Constitution*, and also the first steel produced in the province. A second Sterling furnace was built in 1777, and in 1806, near the same locality, the Southfield furnace which is still standing. Modern furnaces have now replaced the first two.

In the second half of the 18th century additional furnaces were built in Orange County, namely the Forest of Dean Furnace, some iron works on the Ramapo, the Queensborough Furnace and a furnace near Craigsville.

Iron works were in operation at the time of the revolution in Dutchess, Westchester, Rockland and Suffolk counties. In 1800 the Champlain iron district began to be developed and in 1801 iron works were erected in Essex County for the manufacture of anchors. The iron industry of the State became afterward more prosperous.

Iron works are said to have been erected in South Carolina in 1773, while the Era and Etna furnaces in York County were built respectively in 1787 and 1788. Other furnaces were built later, but they have now all been abandoned and the manufacture of iron in that State has ceased.

The making of iron in Tennessee began only in 1790 when a bloomary was built at Embreville, in Washington County. Other bloomaries were erected soon afterward in Carter, Johnson, Greene and Jefferson counties. A large furnace and forge was built in Sullivan County and a bloomary about 1795 near the mouth of the Watauga. In 1792 the Cumberland furnace was erected in Dickson County. During the 19th century and since the iron industry in Tennessee has made great progress.

The Bourbon Furnace, built in 1791 in Bath County, Kentucky, is the only one erected in that State during the 18th century. Other iron works, however, were erected in the following century.

In Georgia iron works were built probably in about 1790, in Elbert and Chatham counties and others in the 19th century.

Ohio, Alabama, Missouri, Illinois, Indiana, Michigan, Wisconsin and Texas made no iron in the 18th century, but some of these States became important producers of iron in the following century.

In the following States the manufacture of iron was not begun until the second half of the 19th century: Minnesota, Arkansas, Kansas, Iowa, Colorado, Wyoming, Utah, California, Oregon and Washington territory. It is believed that no iron has ever been produced in the States and territories not mentioned in this brief sketch.

For a more detailed description of the early iron and steel industry of the United States the reader should consult the excellent history written by James M. Swank from which most of the data needed for this article has been obtained.

The development of the iron and steel industry in the United States during the 19th century has been marked by many events, some of which will be briefly mentioned.

In 1801 the development of the iron mines from the Champlain district in New York resulted in the erection in that State of many forges, furnaces and even, later, of rolling mills. As late as 1883 there were 27 forges for the direct reduction of iron ores and the manufacture of blooms; in 1890 only 14 were in operation and in 1900 but a single one was still active. Many forges were also built in New Jersey, nine of which now remain.

In 1811 the first rolling mill was built at Pittsburgh. It was known as the Pittsburgh Rolling Mill.

In 1816 wire fences were manufactured by White and Hazard at their works at the falls of Schuylkill. The same year the first puddling furnace was built by Isaac Messon in Fayette County, Pennsylvania. The first boiler plates made in the States were rolled at the Brandywine Rolling Mill at Coatesville, Pa., some time previous to 1825.

Bar iron was first made in New England at the Boston Iron Works in 1825.

Crucible steel was for the first time manufactured on a commercial scale in 1832 by the Garrard brothers in Cincinnati at their works called the Cincinnati Steel Works.

Hot blast for making pig iron was first used in the United States at the Oxford Furnace in New Jersey in 1834. Cast iron pipes were utilized being heated by the waste heat of the furnace at the tymp. The temperature of the blast was raised to 250° F. and the output of pig iron increased by about 10 per cent. Later arched cast iron pipes were placed at the top of the stack and heated by the flame from the tunnelhead, the temperature of the blast reaching by this means 500° F.

Coke as a blast furnace fuel was first successfully used by Williams Firmstone at Mary Ann Furnace in Huntington County, Pa., in 1835.

In the same year Henry Burden of Troy, N. Y., patented machine-made horse shoes and in 1840 the Burden rotary squeezer.

Probably the first successful use in the States of anthracite in the blast furnace was by Benjamin Perry at the Pioneer Furnace at Pottsville, Pa., in 1839, and by David Thomas at the Lehigh Crane Iron Company at Catasauqua, Pa.

Iron ore was discovered in the Lake Superior region on 16 Sept. 1844 in northern Michigan by William A. Burt, a deputy surveyor of the general government. The Jackson Mining Company was organized the following June at Jackson, Mich., and the ore from the Jackson Iron Mountain used in some neighboring bloomaries.

The manufacture of heavy iron rails was undertaken in 1844 at the Mount Savage Rolling Mill in Allegany County, Md. Here also the first T rails rolled in the United States were manufactured, although it is claimed by some that this honor is due to the Montour Rolling Mill of Danville, Pa. The production of iron rails was 21,712 tons in 1849. It reached its

highest figure in 1872 when 808,866 tons were manufactured. In 1900 but 695 tons were rolled.

Bituminous coal was successfully used in blast furnaces in 1845 in a furnace located in Mercer County, Pa., and in 1846 in a furnace expressly built for that purpose at Lowell, in Mahoning County, Ohio.

The first shipment of iron from Lake Superior was made in 1850 to New Castle, Pa.

Wire nails were first manufactured in the United States in 1852 by William Hassall at New York.

In 1852 David Thomas of Catasauqua, Pa., constructed for his furnace powerful blowing engines, thereby greatly increasing the blast pressure and increasing the output of pig iron. Lake Superior ore was first used in a blast furnace at the Sharpsville Furnace, Mercer County, Pa.

Rolled wrought iron beams were made in 1854 by Peter Cooper at Trenton, N. J.

In 1855 more pig iron was made with anthracite than with charcoal.

It is believed that 30-foot rails were first rolled at the Cambria Iron Works, Johnstown, Pa., in 1855.

In 1859 the first blast furnace was built in Allegheny County, Pa. It was known as the Clinton Furnace.

As late as 1860 there were about 200 Catalan forges or bloomaries, south of the Ohio and Potomac rivers, making bar iron directly from the ore and blown by the trompe or by wooden "tubs" operated by water power. At the end of the century but one of these was in operation.

In 1862 Samuel J. Reeves of the Phœnix Iron Company, Pa., invented the wrought iron and steel columns now so widely used for bridges and many other structures.

Bessemer steel was first made in the United States by William F. Durfee in 1864 at Wyandotte, Mich., by the Kelly Pneumatic process. Bessemer's steel patents were acquired in 1864 by John F. Winslow, John A. Griswold and Alexander L. Holley of Troy, N. Y. In February 1865 Bessemer steel was successfully produced at Troy by Mr. Holley. The first Bessemer steel rails made in the United States were rolled in May 1865 at the Chicago Rolling Mill.

In 1867 John A. Griswold and Company of Troy, N. Y., constructed the first generative Siemens gas furnace in the United States and used it as a heating furnace in their rolling mill.

In 1868, Cooper, Hewitt and Company built and put in operation, at their works of the New Jersey Steel and Iron Company, Trenton, N. J., the first open hearth furnace for the manufacture of steel.

In 1869 the output of pig iron made with raw bituminous coal and with coke exceeded for the first time the production of charcoal pig iron. In 1869 a Siemens regenerative furnace was used by William F. Durfee for the puddling of iron at Bridgeport, Conn. Iron ore was imported from Canada in considerable quantity in 1873 and the following years. In 1879 importation started from Mediterranean countries, chiefly Spain, Algeria and Elba. Importations from Cuba, so important at the present time, did not begin before 1884.

Natural gas was used for the first time for the manufacture of iron in 1874 at the Siberian Rolling Mill in Armstrong County, Pa.

In 1875 the output of pig iron made with bituminous coal exceeded for the first time that made with anthracite.

The Edgard Thomson Steel Company rolled in 1875 the first 60-foot rails made in the United States. The same year Whitwell fire-brick hot-blast stoves were used at the Rising Fawn Furnace, Dade County, Ga.

The first steel wire nails were made in 1875 by Father Goebel at Covington, Ky.

Siemens-Cowper-Cochrane fire-brick hot-blast stoves were erected in 1877 at the Crown Point Furnaces, Crown Point, N. Y.

The Brooklyn suspension bridge which was in process of construction between 1869 and 1883 was built entirely of American made steel wire cables, John A. Roebling being the engineer.

Basic steel was first made in this country in 1884 at Steelton, Pa., by the Pennsylvania Steel Company in a Bessemer converter.

Armor plates to be made in America were first contracted for in 1887 by the Navy Department with the Bethlehem Iron Company.

Basic open hearth steel was first manufactured in the States in 1888 at the Homestead Steel Works of Carnegie, Phipps Company, Ltd., at Homestead, Pa.

The progress made in the iron and steel industry during the 20th century to date consists in important manufacturing improvements that have resulted in economy and in increased production. They include the mining, handling and treatment of ores, blast furnace construction and operation, coke making and steel manufacture. Improvements resulting in the production of new steels or of steel of better quality have also been recorded. These were generally brought about through a more scientific treatment of the metals made possible by remarkable progress in the science of metallography.

The advance in the handling and treatment of iron ore includes improvements in mining methods, in land and water transportation, in appliances for transferring the ore from railway cars to vessels, to railway cars again and to furnace top and its introduction into the furnace. These operations are described by John Brikinbine as follows:

"The bulk of the domestic iron ore used in the United States is not touched by the hand of man from the time it leaves the mine until it is converted into forms for sale, as rails, structural shapes, wire rods, sheets, merchant bars, etc., and in many of the operations the ore is dug by power shovels, or 'milled' through chutes, so that even in mining but little hand labor is necessary. Lifted from its bed by dippers on power shovels, ore is loaded into railway cars or directed through 'mills' into chutes, or mined by pick and shovels and shot into mine tram cars. The cars run to pockets feeding skips, which are raised by power and automatically dumped into waiting railway cars, except when climatic conditions, stagnant trade or the desirability of discontinuing operations, require that ore be stocked for future shipment. Where necessary the ore passes through intermediate crushers to reduce the size of pieces; but in crushing, stocking or reloading,

man directs the movement of machinery and touches but little of the ore.

"Railway cars, with their loads of iron ore, convey it to blast furnaces, or, as is the custom with most Lake Superior ores, to docks provided with pockets, into which the ore drops through the opened bottoms of the cars, while spouts connecting with the dock pockets deliver the ore by gravity into holds of vessels specially constructed for the iron ore trade. At the end of the vessel's trip, mechanical devices remove the ore and deposit it in cars or on stock piles.

"As lake navigation is suspended for five months in the year on account of ice, stock piles are accumulated at the mines, at receiving docks at lower lake ports, and at blast furnaces, where elaborate mechanical equipment facilitates the handling of this ore when used.

"When the furnace is reached to which the ore is consigned the railway cars are run onto 'car dumpers' which turn the cars over to discharge their contents into pits from which the ore is carried by cable or tramways to stock piles, or the cars drop their contents into the furnace supply bins. From the bins, whether fed direct from cars or from stock piles, the ore is chuted to scale charging cars which feed to skip cars. These skip cars, which also receive the fuel and fluxing material, are elevated to the furnace top and automatically discharge their contents."

Much progress has been made in the beneficiation of ores including magnetic separations and agglomerations (briquetting, nodulizing and sintering) by which enormous deposits of fine ore, of ore containing much moisture, too rich in sulphur or phosphorus or too lean are now converted into excellent smelting material, with the frequent additional advantage of doing away with the cost of transportation from mine to furnace of a great weight of gangue, of moisture or of combined waters.

The rapid growth of the production of iron ores in the United States as well as some other features are shown in the following statistical tables:

PRODUCTION OF IRON ORE IN LAKE SUPERIOR DISTRICT.

YEAR	Tons	YEAR	Tons	YEAR	Tons
1855	1,449	1900	19,059,393	1913	52,518,158
1860	114,401	1905	34,353,456	1914	33,629,613
1870	859,507	1910	43,442,397	1915	46,994,254
1880	1,948,334	1911	32,793,120	1916	64,734,198
1890	9,003,725	1912	46,483,798	1917	62,498,901

It will be seen that over 80 per cent of the iron ore mined in the United States are obtained from the Lake Superior district.

UNITED STATES IMPORTATIONS AND EXPORTATIONS OF IRON ORES (in tons).

YEARS	Importations	Exportations
1880	501,000	.....
1890	1,267,000	.....
1900	912,000	.....
1905	860,000	.....
1910	2,632,000	.....
1911	1,841,000	780,900
1912	2,139,000	1,214,430
1913	2,594,970	.....
1914	1,351,368	.....
1915	1,341,281	707,641
1916	1,325,736	1,183,952
1917	971,663	1,141,048

Of the iron ores now imported in the United States more than 60 per cent come from Cuba and the balance chiefly from Sweden, Canada and Spain.

FURNACES IN BLAST AND OUT OF BLAST ON 31 DECEMBER.

YEARS	Active	Idle	Total
1873	413	244	651
1880	446	255	707
1890	311	251	562
1900	232	174	406
1905	313	111	424
1910	206	267	473
1911	331	234	465
1912	313	153	466
1913	191	275	466
1914	154	312	466

It is evident that the number of furnaces active in any one year gives no indication as to the production of pig iron in that year. The 446 furnaces active in 1880 produced but 3,897,000 tons of iron or 8,738 tons per furnace, while in 1913 with but 191 active furnaces the production of pig iron was 31,361,000 or 164,700 tons per furnace, a production per furnace nearly 20 times greater.

IRON ORES BY COUNTRIES (in tons).

YEARS	United States	England	France	Germany	World's production
1870	3,080,000	14,601,000	2,614,000	3,879,000	28,274,000
1880	7,234,000	18,314,000	2,874,000	7,239,000	43,324,000
1890	16,293,000	14,001,000	3,472,000	11,406,000	56,997,000
1900	26,382,000	14,282,000	5,448,000	18,964,000	86,523,000
1905	43,207,000	14,824,000	7,395,000	23,444,000	112,218,000
1910	57,803,000	15,470,000	14,606,000	28,710,000	139,425,000
1911	41,646,000	15,768,000	16,639,000	29,879,000	132,168,000
1912	56,035,000	14,012,000	19,160,000	33,734,000	153,841,000
1913	62,972,000	16,254,000	21,918,000	35,941,000	170,255,000
1914	41,439,761	15,115,375	.....	.....	.....
1915	55,526,490	14,464,196	.....	.....	.....
1916	75,167,672	13,811,920	.....	.....	.....
1917	75,324,000	.....	.....	.....	.....

It will be seen that the United States in 1890 mined more iron ore than England and than Germany. In 1913 it mined nearly four times more ore than in 1890, nearly four times more than England whose production had remained nearly stationary and nearly twice more than Germany. It contributed in that year 37 per cent to the world's production.

SHIPMENTS OF LAKE SUPERIOR IRON ORE BY RANGES (gross tons).

YEARS	Mesabi	Marquette	Gogebic	Menominee	Vermillion
1860		114,401			
1870		830,940			
1880		1,384,010		524,735	
1890		2,993,664	2,847,786	2,282,237	880,014
1900	7,809,535	3,457,522	2,875,295	3,661,221	1,655,820
1905	20,158,699	4,215,572	3,705,207	4,495,451	1,677,186
1910	29,201,760	4,392,726	4,315,314	4,237,738	1,203,177
1911	22,093,532	2,833,116	2,603,318	3,911,174	1,088,930
1912	32,047,409	4,202,308	5,006,266	4,711,440	1,844,981
1913	34,038,643	3,966,680	4,531,558	4,965,604	1,566,600
1914	21,465,967	2,491,857	3,568,482	3,221,258	1,016,993
1915	29,756,689	4,105,378	5,477,767	4,982,626	1,733,595
1916	42,525,612	5,396,007	8,489,685	6,364,363	1,947,200
1917	41,445,211	4,874,150	7,981,684	6,045,750	1,530,692

The Mesabi range which was not exploited in 1890 produced over 40,000,000 tons in 1917 or nearly 70 per cent of the total production of the Lake Superior district and considerably more than half the total United States production in that year.

IRON ORES BY KINDS (tons).

YEARS	Hematite	Brown ore	Magnetite	Carbonate	Totals
1860					2,919,000
1870					3,893,000
1880	2,280,000	1,950,000	2,168,000	836,000	7,234,000
1890	10,696,000	2,601,000	2,612,000	384,000	16,293,000
1900	23,071,000	3,283,000	1,562,000	77,000	27,993,000
1905	38,168,000	2,581,000	2,428,000	23,000	43,200,000
1910	52,189,000	3,042,000	2,674,000	22,000	57,927,000
1911	40,269,000	2,065,000	2,238,000	16,000	44,579,000
1912	52,167,000	1,640,000	2,215,000	10,000	56,032,000

The production of hematite ores was in 1912 nearly five times greater than in 1890 while during the same period the mining of brown ores was reduced by 40 per cent, that of magnetites remained practically unchanged and the production of carbonate ores dwindled down to 10,000 tons.

Over 90 per cent of the ores now mined in the States are, therefore, of the hematite variety. They generally contain between 50 and 65 per cent of metallic iron.

PIG IRON PRODUCTION BY COUNTRIES (gross tons).

YEAR	United States	England	France	Germany	World's production
1870	1,665,000	6,061,000	1,178,000	1,400,000	12,053,000
1880	3,897,000	7,875,000	1,725,000	2,729,000	18,547,000
1890	9,353,000	8,033,000	1,962,000	4,658,000	27,630,000
1900	14,009,000	9,003,000	2,715,000	8,520,000	40,198,000
1905	23,360,000	9,746,000	3,076,000	10,987,000	54,054,000
1910	27,636,000	10,380,000	4,038,000	14,793,000	66,352,000
1911	24,027,000	9,874,000	4,470,000	15,579,000	63,251,000
1912	30,202,000	8,891,000	4,939,000	17,869,000	75,029,000
1913	31,461,000	10,649,000	5,122,000	19,309,000	80,172,000
1914	23,332,244	9,005,898	5,025,000	14,389,547	62,844,609
1915	29,916,213	8,793,659	4,750,000	11,790,199	64,515,928
1916	39,434,797	9,047,983			
1917	38,647,397	9,572,190			

In 1890 the United States produced more pig iron than England and twice as much as Germany. In 1913 its production was roughly three times that of 1890, three times that of England, one and two-thirds that of Germany, while contributing that year nearly 40 per cent to the world's production. During the last three years it produced more than 100,000,000 tons.

PIG IRON PRODUCTION BY STATES.

	1912	1913	1914	1915	1916	1917
Pennsylvania	12,753,000	13,162,000	9,733,369	12,790,668		
Ohio	6,911,000	7,244,000	5,283,426	6,912,962		
Indiana, Illinois and Michigan	4,732,000	4,779,000	3,404,806	4,433,998		
Virginia and Alabama	2,153,000	2,437,000	2,098,151	2,300,799		
New York, New Jersey and Maryland	2,231,000	2,517,000	1,755,458	2,356,828		
Other States	1,422,000	1,322,000				
Total	30,202,000	31,461,000	23,332,244	29,916,215		

The State of Pennsylvania contributes more than 40 per cent to the total production of pig iron, the State of Ohio nearly 25 per cent, Indiana, Illinois and Michigan combined 15 per cent, New York, New Jersey and Maryland 7½ per cent, Virginia and Alabama 7½ per cent.

PRODUCTION OF PIG IRON BY GRADES, 1900–17.

YEARS	Basic	Bessemer	Foundry	Malleable	Forge	All other	Total (gross tons)
1900	1,072,376	7,979,327	3,376,445	173,413	793,092	394,589	13,789,242
1905	4,105,179	12,407,116	4,758,038	635,236	727,817	358,994	22,992,380
1910	9,084,608	11,245,642	5,260,447	843,123	564,157	305,590	27,303,567
1911	8,520,020	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244
1915	13,093,214	10,523,306	4,843,899	829,921	316,214	309,659	29,916,213
1916	17,684,087	14,422,457	5,553,644	921,486	348,344	504,779	39,434,797
1917	17,671,662	13,714,732	5,328,258	1,015,579	345,707	571,459	38,647,397

In 1917, therefore, over 31,000,000 tons of pig iron or about 80 per cent of the total production were converted into steel, chiefly by the acid bessemer and by the basic open hearth processes. Although the production of basic pig iron was not greatly superior to that of bessemer pig iron, it implies a much larger tonnage of basic open hearth steel because of the large proportion of scrap used by that process. Indeed, in 1917 the production of open hearth steel was more than three times that of bessemer steel.

STEEL PRODUCTION.

YEARS	United States	England	France	Germany	World's production
1880	1,267,000	1,320,000	389,000	624,000	4,274,000
1890	4,346,000	3,637,000	684,000	1,613,000	12,450,000
1900	10,382,000	5,130,000	1,642,000	6,645,000	28,342,000
1905	20,354,000	5,983,000	2,241,000	10,066,000	44,295,000
1910	26,512,000	6,106,000	3,390,000	13,698,000	60,200,000
1911	24,054,000	6,565,000	3,668,000	15,019,000	61,000,000
1912	31,751,000	6,904,000	4,075,000	17,301,000	72,000,000
1913	31,801,000	7,786,000	4,419,000	18,949,000	75,000,000
1914	23,513,030	8,550,015	.....	.....	.....
1915	32,151,036	9,196,457	.....	.....	.....
1916	42,773,680	9,752,326	.....	.....	.....
1917	45,060,607	.....	.....	.....	.....

In 1913 the production of steel in the United States, France and Germany was roughly three times greater than in 1900. In England, however, it had only increased by about 50 per cent. During the last decade the United States have each year contributed about 40 per cent of the world's production of steel. In 1917 the percentage was probably considerable greater.

STEEL INGOT PRODUCTION IN THE UNITED STATES BY KINDS (tons).

YEARS	Bessemer ingots	Open-hearth ingots	Crucible	Total
1900	6,678,303	3,220,644	96,579	9,995,526
1905	10,919,272	8,444,836	99,072	19,463,180
1910	9,354,437	15,641,158	158,492	25,154,087
1911	7,890,753	15,027,459	111,267	23,029,479
1912	10,259,151	19,909,875	115,656	30,284,682
1913	9,465,200	20,689,715	125,215	30,280,130
1914	6,220,846	17,174,684	89,869	23,513,036
1915	8,287,213	23,679,102	113,782	32,151,036
1916	11,059,039	31,415,427	129,692	42,772,680
1917	10,479,960	34,148,893	126,716	45,060,607

The total production of steel in 1913 was three times that of 1900. In 1917 it was nearly twice that of 1914. In 1900 the production of bessemer steel was twice that of open hearth steel, but in 1917 the production of open hearth steel was more than three times that of bessemer steel. The production of crucible steel shows little variation.

UNITED STATES IMPORTATIONS AND EXPORTATIONS OF PIG IRON (tons).

YEARS	Importations	Exportations
1875	76,112	8,370
1880	711,832	1,901
1890	137,067	16,597
1900	53,388	291,173
1905	214,000	49,991
1910	241,000	129,000
1911	149,000	123,000
1912	131,000	277,000
1913	122,500	282,000
1914	141,218	116,330
1915	91,303	226,891
1916	137,528	617,012
1917	78,022	665,815

Barring the abnormal conditions prevailing during the war the tonnage of pig iron imported or exported is relatively very small and shows little tendency to increase. The totality of the pig iron produced in the United States is practically used for home consumption and is sufficient.

PIG IRON PRODUCTION ACCORDING TO FUELS (gross tons).

YEARS	Anthracite	Charcoal	Coke	Total
1854	303,067	305,623	48,647	657,337
1860	463,581	248,510	109,132	821,223
1870	830,357	325,893	508,929	1,665,179
1880	1,613,974	479,963	1,741,254	3,835,191
1890	2,186,411	628,145	6,388,147	9,202,703
1900	1,677,048	384,482	11,727,712	13,789,242
1905	1,674,515	352,928	20,964,937	22,992,380
1910	649,082	396,507	26,257,978	27,303,567
1911	229,575	278,676	23,141,296	23,649,547
1912	247,179	347,025	29,132,733	29,726,937
1913	277,347	339,981	30,348,973	30,966,301
1914	170,000	260,000	22,800,926	23,230,926
1915	84,753	296,152	29,535,308	29,916,213
1916	217,788	372,411	38,844,598	39,434,797
1917	381,048	376,525	37,889,824	38,647,397

The following conclusions may be drawn: (1) The production of pig iron in 1910 and in 1917 was respectively three and four times that of 1890; (2) the production of charcoal pig iron has varied little since 1900, it was smaller in 1914 and 1916 than in 1854; (3) the pig iron made with anthracite exceeded 2,000,000 tons in 1890, but was less than 400,000 tons in 1917; (4) in 1890 coke pig iron contributed about 66 per cent to the total production and in 1917 over 95 per cent.

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IRON MASK, The Man with the, a famous personage who was kept a prisoner in two or three French prisons in the time of Louis XIV, and who excited a curiosity corresponding to the care with which his identity was concealed. His first prison was the castle of Pignerol, of which Saint-Mars was governor. In 1686 he was carried by Saint-Mars to the isles of Saint Marguerite; and the same precautions were observed as upon his first journey. Saint-Mars having been appointed governor of the Bastile in 1698, carried the prisoner with him there, but still masked. An apartment had been prepared for him more convenient, and furnished with more care than those of the other unfortunate beings who inhabited this sad abode. He was not permitted to take off his mask even before his physician. In other respects the greatest attention was shown him, and nothing which he requested was refused him. His education appeared to have been carefully attended to; and he amused his leisure by reading, and playing upon the guitar. This unknown person died 19 Nov. 1703, at 10 o'clock in the evening, without having undergone any severe sickness. He was buried the next day in the afternoon in the cemetery of the church of Saint Paul. He was, it was said, about 60 years of age, although the register of burials for the church of Saint Paul, in which he is mentioned under the name of Marchiali, makes him only about 45. It is said that orders were given to burn everything which had been employed in his service; that the walls of the chamber which he had occupied were rubbed down and whitewashed; and that the precautions were carried so far, that the tiles of his room were removed, in the fear that he might have displaced some of them to conceal a letter behind them. Conjecture exhausted itself to discover who this mysterious personage might be.

At the time of the destruction of the Bastile, in July 1789, there were not wanting curious persons, who sought, in the archives of this fortress, to discover some notices which might throw light upon this historical problem. But to no purpose. A widely-accepted conjecture was first thrown out in a letter written in 1770 by Baron D'Heiss to the *Journal Encyclopédique*. According to this view the Man with the Iron Mask was Count Girolamo Magni, or Mattioli, first minister of the Duke of Mantua, who had betrayed the interests of Louis XIV by failing to secure for him, as he had pledged himself to do, in consideration of a large bribe, possession from his master of the fortress of Casale. For this offense he was lured to the French frontier, secretly arrested and imprisoned in the fortress of Pignerol in 1679. The secret was preserved so carefully, on the supposition that Mattioli was the prisoner, because his seizure and detention were flagrant violations of international law. In a more recent investigation by M. Jung, 'La Vérité sur le Masque de Fer' (1873), an attempt is made to identify the Mask with a gentleman of Lorraine, who was connected with an association for the assassination of Louis. Others at various times have tried to prove that he was a twin brother of Louis XIV, a natural son of the king, the English Duke of Monmouth, etc. Funck-Brentano in 1894 revived the view that Mattioli was the mysterious prisoner, and many now consider the controversy settled and this view established. Much of the material on which all the books, written in large numbers on this subject, are based is purely conjectural and it is doubtful if the true facts will ever be established. Around the story of the Mask, Dumas built one of his novels, 'Viscomte de Bragelonne.' Consult Barnes, A. S., 'The Man of the Mask' (London 1908); Bröcking, W., 'Zur Forschung über die Eiserne Maske' (in *Historische Vierteljahrschrift*, Vol. XV, p. 363, Leipzig 1904); Delort, J., 'Histoire de l'Homme au Masque de Fer' (Paris 1825); id., 'Histoire de la Detention des Philosophes' (3 vols., Paris 1829); Funck-Brentano, F., 'L'Homme au Masque de Velours Noir Dit le Masque de Fer' (in *Revue Historique*, Vol. LVI, Paris 1894); Hopkins, T., 'The Man in the Iron Mask' (New York 1901); Jung, M., 'La Verité sur la Masque de Fer' (Paris 1873); Lair, J., 'Nicolas Foucquet' (Vol. II, Paris 1890); Lang, 'The Valet's Tragedy' (London 1903); Loiseleur, J., 'Trois Enigmes Historiques' (Paris 1882); Roux-Fazillac, P., 'Recherches Historiques sur l'Homme au Masque de Fer' (Paris 1801); Topin, M., 'L'Homme au Masque de Fer' (Paris 1870); Voltaire, 'Siècle de Louis XIV' (Paris 1751).

IRON MOUNTAIN, Mich., city, county-seat of Dickinson County; on the Chicago, Milwaukee and Saint Paul, the Wisconsin and Michigan and the Chicago and Northwestern railroads; about 47 miles southwest of Marquette and 57 miles west by north of Escanaba. It was settled in 1879 and chartered in 1888. It is the commercial centre for a large mining section in Michigan and for a farming section in Wisconsin. It has a Carnegie library. The

city government consists of a mayor and council, elected annually. Its trade is principally in iron-ore, lumber and farm products. Pop. 9,216.

IRON MOUNTAIN, Mo., the southern spur of the Saint Francois Mountains, a low range in the eastern part of the State. This mountain, which is really a hill or knob, is in Saint Francois County, about 60 miles southwest from Saint Genevieve, the nearest point on the Mississippi River and 80 miles south of Saint Louis on the Iron Mountain Railroad. It is about 300 feet above the surrounding land and about 2,000 feet above the sea. It covers an area of 500 acres. It is famous for its remarkable mineral deposits, specular or hematite iron-ore, the purest iron-ore in the United States. The average elevation above the land around is 550 feet, and the area it covers is about 500 acres. Large oak trees flourish on its slope, their roots embedded in soil composed largely of fragments of peroxide of iron. Excavations were begun in 1845. An artesian well was sunk to the depth of 152 feet, with the result that the beds passed through from the surface were as follows: Iron ore mixed with clay, 16 feet; sandstone, 34 feet; magnesian limestone, 7½ inches; gray sandstone, 7½ inches; hard blue rock, 37 feet; pure iron ore, 5 feet; porphyritic rock, 7 feet; iron ore, 50 feet to the bottom. It would seem that nearly the whole mountain was a mass of magnetic iron ore. The adjacent valleys are underlaid with magnesian limestone in horizontal strata. Pilot Knob (q.v.), about six miles south of Iron Mountain, also contained an extensive deposit of iron ore; Shepherd Mountain, a short distance southwest of Pilot Knob, is the largest of the iron mountains in that immediate vicinity. See IRON ORES.

IRON ORES. Although iron is the most abundant of the useful metals, forming 5 per cent of the earth's crust, it is rarely found native — one famous native occurrence of it, however, being at Ovifak on the west coast of Greenland. The iron ores of chief commercial importance are hematite, magnetite, limonite, siderite and pyrite. Pure hematite contains 70 per cent iron; magnetite 72.4 per cent; limonite 59.89 per cent; siderite 48.27 per cent; pyrite 46.6 per cent. Iron ores, however, are practically never mined pure, but as mined in quantity, averages over 10 per cent less iron than above stated, the principal impurities being silica, alumina and lime.

Hematite, ferric oxide (Fe_2O_3), by far the most important iron ore, varies greatly in physical characteristics. Specular hematite is black, with a brilliant metallic lustre. Hematite yields 90 per cent of our supply of iron, in the United States. Martite is a variety of hematite. Magnetite, a ferro-ferric oxide ($FeO.Fe_2O_3$), is black, magnetic, and crystallizes in octahedra, but as mined it is usually massive or granular. Ilmenite, an oxide of iron and titanium, is not yet an ore of commercial importance. Franklinite, an oxide of iron, manganese, and zinc, found at Franklin, N. J., is used in making spiegeleisen, an alloy of iron and manganese after the zinc has been removed by roasting. Limonite or brown hematie, hydrated ferric oxide ($2Fe_2O_3.3H_2O$), is brown or yellow in color and occurs in massive, earthy or botryoidal forms. Bog-ore is a variety of limonite. Goethite, differing from limonite in crystalline form and containing less water, is found in large quantities in Minnesota. Siderite, or spathic iron, ferrous carbonate ($FeCO_3$), is white to gray when pure, and crystallizes in rhombohedra. As mined, it varies much in appearance, owing to oxidation. Clay iron stone is siderite mingled with clay. Blackband ore is siderite mixed with more or less bituminous matter. Pyrites, ferric disulphide (FeS_2), often called "fool's gold," is used in great quantities to make sulphuric acid. The residue, known as "blue-billy," or pyrites clinker, is in some countries smelted in the blast-furnace as an iron ore.

Origin of Iron Ores.— Many of the large bodies of magnetite in the Adirondacks and in Sweden are believed to be magmatic segregations (q.v.), having solidified out as great masses of igneous rock cooled. Most of the hematite ores are believed to have been laid down as beds of sedimentary rock. The iron ores of the Clinton (q.v.) age extending in patches from New York to the Birmingham district in Alabama, are believed to have been laid down as beds of hematite in the ocean. The vast deposits of the Lake Superior region and the still larger deposits of Brazil are thought by many to have been laid down in the ocean as very thick beds of iron carbonate and iron silicate. As the region was uplifted and eroded they weathered to hematite. Limonites in many places seem to have resulted from the weathering of rocks in which there was but little iron. During the weathering process the insoluble iron remained behind, becoming richer by the removal of soluble impurities. This also is believed to be the origin of the great Cuban deposits of hematite. In some places limonite is also accumulating in swamps, where it is called "bog iron ore" (q.v.). Similar deposits are now in process of formation in the Three Rivers District of Quebec. In smelting an ore the silica, lime and alumina are removed as slag. Ores high in silica require more limestone in the furnace-charge for fluxing, that is, for combining with the silica. Some ores contain silica and lime in such proportions as to be self-fluxing. The higher the iron content of an ore, generally speaking, the greater the yield per ton of material put through the furnace, and the lower the cost per ton of the iron made.

A very hard ore must be broken into small lumps to give best results in the furnace. Hematites often smelt easier than magnetites. A fine granular ore makes trouble in smelting, and a certain proportion may be lost as dust, which clogs furnace-flues. The really injurious impurities most often found in iron ores are sulphur, phosphorus and titanium. Sulphur can be largely removed by roasting the ore before smelting; phosphorus cannot, and all the phosphorus in the ore goes into the iron. For making steel by the Bessemer process an ore should contain less than 1-1,000 of its amount of iron; thus, to be classified as Bessemer, an ore containing 61 per cent iron should contain less than .061 per cent phosphorus. For making steel by the basic process, high phosphorus ores are used.

The present development of the world's iron mines is the outcome of many factors. Gen-

erally speaking, it is cheaper to bring the ore to the fuel than the fuel to the ore, hence, countries or districts that have great supplies of iron ore may be insignificant producers of pig-iron. Low-priced fuel has been the chief factor in determining the location of iron and steel industries, while the chief factors in the development of iron mines are the quality of the ore and the cost at which it can be put down at the furnace.

Iron-Ore Supplies of the World.— The iron industry in Asia is several thousand years old, but the annual output of iron ore is small. China has vast but little-developed deposits of limonite and hematite. Japan is very poor in iron ores. The iron industry of Australia is not of importance. The only ores exported from Africa are mined in Algeria, where the annual production has fallen to about 150,000 tons. Europe has famous ore fields. The ores of Elba and those of Styria were worked by the Romans. Certain Swedish mines have been worked almost continuously since 1300. The German output now comes chiefly from so-called minette beds of Lorraine and Luxemburg. The ore, a low-grade limonite high in phosphorus, is used in making steel by the basic process, and the present annual output is over 7,000,000 tons annually. The total ore supply left in the field is estimated at nearly 2,000,000,000 tons. The iron fields of Great Britain have passed their greatest productiveness. The principal districts are Cleveland in North Yorkshire, yielding clay ironstone containing about 30 per cent iron; Cumberland and Lancashire, yielding red hematite containing 50 to 60 per cent iron; and Lincolnshire, Leicestershire and Northampton, yielding cheaply-mined low-grade hematite. The blackband ores of Scotland are of much less importance than formerly. The principal Spanish mines are in the Bilbao district in the province of Biscay, the productive field being 15 miles long and 2½ wide. The ores are red and purple hematite, limonite, and carbonate, the iron content in the crude ores running from 45 to 56 per cent. The district has produced to date about 95,000,000 tons. The greater part of the Russian ore supply comes from the Ural Mountains, the ores on the east side of the range being magnetite, and on the west side limonite and carbonate. Near Krivoi Rog, in the Caucasus, are mines of hematite and magnetite. Fully 80 per cent of the iron ore of France is obtained from the minette beds of the Moselle that extend into Lorraine and Luxemburg. Most of the French ores are limonites. The principal Austrian iron mines are in Styria, the Styrian Erzberg having one of the largest deposits of siderite in Europe, yielding yearly about 1,000,000 tons of carbonate ore, containing 40 per cent of iron. In Bohemia are mines of magnetite, limonite and siderite. Sweden has immense deposits of iron ore, chiefly magnetite with some specular hematite. The most important deposits are at Grangsberg in Central Sweden, where are specular hematite and magnetite ores containing 62 to 64 per cent iron and 0.9 to 1.5 per cent phosphorus, and at Gellivare, 100 miles from the Gulf of Bothnia, where are huge bodies of magnetite that run from 68.69 iron and 0.05 phosphorus to 60 per cent iron and 1.5 per cent phosphorus. The ores from this field and the neighboring districts of Kurunavara and Luossavara will be of great importance to British iron-masters.

The total production of iron ore of the entire world for 1912 (the latest year for which the figures are reasonably complete) was 148,663,995 gross tons. The production of the principal mining countries for 1913 was as follows:

	Gross tons
United States	61,980,437
Germany and Luxemburg	26,771,598
France	21,572,835
United Kingdom	15,997,328
Spain	9,706,366
Russia (about)	8,500,000
Sweden	7,357,845
Austria-Hungary	5,018,109
Cuba	1,582,431

The iron ore supplies of South America are known to be very extensive, but lack of transportation facilities have delayed development. One of the largest ore bodies in the world is the great hematite deposit in the state of Minas Geraes, Brazil, estimated to be three times as large as the Lake Superior deposits. It shows an iron content ranging from 55 to 65 per cent with so low a phosphorus content as to make it of Bessemer grade. All along the western slopes of the Andes are iron deposits as yet of undetermined extent. The only considerable development has been in Chile, where an ore body of hematite and magnetite testing 100,000,000 tons has been located and is being worked. Mexico and Central America have numerous iron deposits but they have been worked only upon a limited scale.

In the province of Santiago, Cuba, are deposits of high-grade hematite, with an admixture of magnetite, estimated to contain 1,000,000,000 tons, on the south shore, and very large deposits of brown ore on the north shore. From there about 800,000 tons are exported to the United States annually. At Belle Isle, N. F., one of the world's largest deposits of hematite is being worked on a large scale. In Ontario, Quebec, and British Columbia are deposits of good hematite and magnetite, and the Dominion will eventually be a large producer. The iron ore reserves of the known deposits of the world are estimated at 90,000,000,000 tons, calculated to contain about forty billion tons of metallic iron.

The United States leads the world in the production of iron ore. The ores mined range from low grade limonite to the highest grade hematites and magnetites. The iron ore mined in the United States in 1915 amounted to 55,526,490 gross tons, an increase of 34 per cent over the 1914 production, but 10 per cent less than the record output (61,980,437 gross tons) of 1913. The value of the ore at the mines was $101,261,528, an average of $1.83 per ton ($1.81 in 1914). Iron ore was mined in 23 States in 1915 (in 27 States in 1914). The principal yields were: in Minnesota, 32,545,236 tons; in Michigan, 13,664,437 tons; in Alabama, 5,134,955 tons; in Wisconsin, 1,125,269 tons; in New York, 931,745 tons. As regards the variety of ores mined, 52,227,324 tons were hematite; 1,807,002 tons were magnetite; 1,488,709 tons were brown ore; and 3,455 tons were carbonate. All the Lake Superior ore is hematite; the Birmingham (Ala.) ores are 80 per cent hematite and 20 per cent brown ore; the magnetite comes chiefly from the Adirondack region of New York, from northern New Jersey, and from

southeastern New York. The carbonate is mainly from Ohio. The purest ore ever mined in the United States in quantity was probably the magnetite from the Lovers Pit at Mineville, N. Y., which ran 72 per cent iron in carload lots, though the Lake Angeline mine at Ishpeming, Mich., has shipped hard hematite running 68 per cent iron and 0.008 phosphorus in thousand-ton lots. The chief centre of iron ore production in the United States is in the Lake Superior region, where the ores occur along five mineral belts or "ranges," in Pre-Cambrian rocks. The Marquette range, in Michigan, was opened in 1856; the Menominee, mostly in Michigan, but partly in Wisconsin, in 1887; the Gogebic, in Michigan and Wisconsin, in 1884; the Vermilion, in Minnesota, in 1884; and the Mesabi, in Minnesota, in 1892, and the Cuyuna in 1911. The ores shipped are nearly all red hematite. The Marquette produces some magnetite. As much of the ore is hauled long distances to a furnace, 60 per cent iron was once about as low grade ore as could be shipped profitably, but now some mines ship Bessemer ores containing but 45 per cent iron. The ore-bodies are sometimes of great size. The Chapin mine, on the Menominee range, is working lenses 100 feet wide and 600 feet thick in the middle, and 2,500 feet long. The Mesabi deposits are flat-lying, covered by a varying depth of clay, sand and boulders. By stripping off the surface and working the granular ore with steam-shovels, an enormous output is possible.

Iron Ore Districts.— The chief iron ore regions of the United States are usually classified by the United States Geological Survey as shown in the following table, which gives for 1915 the proportion of our total production credited to each.

Lake Superior region	83.4 per cent
Birmingham district, Alabama	8.5 per cent
Chattanooga district, Tennessee	1.0 per cent
Adirondack district, New York	1.3 per cent
New Jersey and South New York	1.2 per cent
Other districts	4.6 per cent

The Lake Superior region is in turn divided into several ranges, and their proportion of the total Lake Superior production is tabulated below.

Marquette range, Northern Michigan	8 per cent
Menominee range, Michigan and Wisconsin	10 per cent
Gogebic range, Michigan and Wisconsin	11 per cent
Vermilion range, Northern Minnesota	3 per cent
Mesabi range, Northern Minnesota	66 per cent
Cuyuna range, Northern Minnesota	2 per cent

In the year 1915 there was taken from the Mesabi range 30,802,409 tons of ore — an increase of 56 per cent over the 1914 yield; an amount equal to 66 per cent of the yield of the whole Lake Superior region, and 55 per cent of the entire yield of the United States. The Menominee range yielded 4,665,465 tons, an increase of 27 per cent over 1914. The Gogebic range yielded 4,996,237 tons — 9 per cent increase; the Marquette, 3,817,892 tons — 15 per cent increase; the Vermilion, 1,541,645 tons — 13 per cent increase; the Cuyuna, 1,120,606 tons — 44 per cent increase. The total yield of the Lake Superior region for 1915 was 46,944,254 tons — 84.54 per cent of the year's yield for the whole United States. The record production of individual mines surpass any in the world. In 1915 the Mahoning mine, at Hibbing, Minn., took first place with an output of 2,311,940 gross tons. The Hull-Rust mine, adjoining the Mahoning, stood second, with 2,307,195 tons. The Red Mountain mines at Bessemer, Ala., which stood first in 1914, was third, with 2,138,015 tons. The individual records of 167 of the principal mines in the United States are to be found on pages 287–289 of "The Mineral Resources of the United States: Part I" for 1915, published by the United States Geological Survey, in 1917.

In the South there are three important iron-mining centres — one near Birmingham, Ala., another in southeastern Tennessee, and the third in southwestern Virginia. The ores are red hematites and low-grade limonites. The growth of the Alabama industry is due to cheap ore, limestone and cooking-coal being found in close proximity. Pennsylvania produces some limonite. Of the western States, Colorado produces limonite, and in Utah and Wyoming are great deposits of magnetite and hematite, destined to be of importance in the future. The famous specular hematite mines at Pilot Knob and Iron Mountain, Mo., are practically exhausted. Texas has large deposits of ore, and several other States are or will be important producers. Various estimates of the apparent reserves of iron ore in the United States range from 5,200,000,000 tons to 7,550,000,000 tons. This supply is being drawn on to the extent of about 55,000,000 tons a year. Besides the great production of its own mines the United States imports annually a considerable quantity of foreign ores. In 1915 this importation amounted to 1,341,281 gross tons, valued at $4,181,645. Of this, 831,618 tons came from Cuba; 204,632 tons from Sweden; 153,600 tons from Chile; 84,124 tons from Canada; 42,092 tons from Spain; and 21,825 tons from French Africa. The exports of the United States for the same year were 707,641 gross tons, valued at $2,181,629.

Mining and Handling Iron Ores.— Some extraordinary records of cheap mining and transportation have been made in the Lake Superior iron-ore trade. Large ore-bodies, efficient labor, and excellent management have been the factors in reducing mining costs, while the long lake-water haul, nearly 900 miles, in specially designed vessels, has made it possible to put down Lake Superior ores at Pittsburg, over 1,100 miles from the mine, at a total transportation cost of under $2 per ton. On the Mesabi range, in some large mines steam-shovels load the ore directly upon the cars, one shovel having loaded 170,000 tons in 26 days, or at the rate of over 6,500 tons per day. The shovels are each operated by five men, and the labor cost for mining and loading averages but about 16c per tons, and at one mine which dug and loaded 293,651 tons in 174 days, the labor cost was only 4c per ton. The loaded ore-trains go 50 to 115 miles to a shipping port. There they are run on to long, high docks having large pockets or bins into which the ore runs through openings in the bottom of the cars. From these pockets the ore passes by gravity down along chutes into the hold of the vessel, so that no hand-labor is required. The ore-pockets hold about 160 tons each, and number from 90 to 384, according to the length of the dock.

In unloading the ore from the vessels the

use of labor-saving machinery is even more notable. A series of steel bridges, easily moved along the docks, is supplied with hinged arms which can be lowered into the hatch of the vessel. Along each arm and across the bridge runs a trolley-train to which are attached automatic grabs similar to a double scoop. The grab or scoop holds about five tons of ore, and when it begins to draw together it digs into the ore. The grabs can remove over half of the cargo without any assistance, and the remaining half is brought directly under the hatch by use of a scraper, operated by similar machinery. The grabs are so controlled by the engineer that he can drop them at any point over the hold he may wish, and after a grab seizes its load of ore it is raised at full speed, carried rapidly along the trolley to any given point, and dumped into railroad cars or on stock piles. This 5-ton grab has a hoisting speed of 100 feet a minute, and can run along the bridge at the rate of 1,000 feet a minute. The bridges to which the arms with their grabs are attached are worked by electricity. By such a device 26 men can do the work of 300 under the old system. Another unloading device, the Hulett unloader requires even fewer men and takes out a larger proportion of the cargo without aid.

See GOETHITE; HEMATITE; ILMENITE; LIMONITE; MAGNETITE; MINING; ORE DEPOSITS. Consult Eckel, C. E., 'Iron Ores' (New York 1914); 'The Mineral Industry' (annually New York); and files of the *Engineering and Mining Journal* and *Engineering Record* (monthly New York).

IRON SKELETON CONSTRUCTION, a modern system of constructing high buildings, by which architects and builders are enabled to plan and erect buildings as high as 15 or 20 stories on plots of ground 20 to 30 feet wide. By the use of this system the thickness of walls is considerably reduced, thus giving a larger floor space, a very desirable consideration, especially in office buildings. Iron and steel columns are carried up from foundation to roof, and then covered in with bricks or stone. Thus a carrying capacity equal to that of walls of much greater thickness is produced. A 12-story building in New York City thus constructed upon a lot 25 by 100 feet means a saving in floor space of thousands of feet. See BUILDING IN THE UNITED STATES.

IRON AND STEEL, Electric Production of. See ELECTROCHEMICAL INDUSTRIES.

IRON AND STEEL, Metallography of. As the study of the constitution of rocks, based, in part at least, upon microscopical examination, is known as petrography, so the study, by similar methods, of the constitution of metals and alloys has been called by analogy metallography, for it was discovered that alloys and impure industrial metals were made up of constituents bearing close resemblance, in many respects, to the minerals of nature. This new department of metallurgy has been actively developed for the last 20 years in all metallurgical countries and notable progress made.

In order to examine the structure of metals through the microscope, it is necessary to prepare surfaces almost absolutely free from the minutest scratches. To accomplish this, it is quite evident that the sample must be rubbed successively over various abrasive substances of increasing fineness. Supposing the surface to be examined has been filed with a smooth file or ground on an emery wheel, the marks left by the tool or wheel could not be removed and a perfectly specular condition imparted to the surface in a single operation. The transformation must be gradual. The file marks must be effaced by rubbing the sample over a properly selected polishing substance, and replaced by finer markings. These, in turn, must be removed by a second rubbing with a finer abrasive agent, being replaced by still finer marks, and so on, until finally, the last operation removes the very minute marks from the previous treatment and leaves the surface quite, if not absolutely, free from scratches. Emery powder of various degrees of fineness is the abrasive substance which naturally suggests itself, at least for the first treatments. The powders may be used in the shape of emery wheels, emery cloths or papers, or even spread loose over a suitable support, in which case they are kept wet during the rubbing. Emery may, of course, be replaced by carborundum for these operations. The polishing powder known as "jeweler's" or "gold" rouge suggests itself for the final polishing. It is generally spread over a piece of wash leather or some other cloth having a soft and smooth texture, which in turn is fastened to a block of wood or to some other suitable support. Washed alumina is also widely used. The powder is generally kept wet during the rubbing. The details of the manipulation vary greatly with different operators, but it may be said that they all use emery (or carborundum) in some form for the rough polishing and jeweler's rouge or washed alumina for the final treatment. Tripoli powder may be used with advantage immediately before the last polishing.

The polishing may be done entirely by hand, or it may be hastened by the use of some simple power-driven machine consisting of revolving emery wheels and discs upon which the various powders are spread.

Many treatments have been tried to develop the structure of polished samples of iron and steel, i.e., to make their structure apparent when examined under the microscope. To do this, it is necessary to impart unlike appearances to the various constituents. The most successful methods consist in etching the polished surfaces with highly diluted aqueous solutions of nitric or picric acid or preferably with alcoholic solution of these acids. Absolute alcohol containing some 10 per cent of nitric acid or 5 per cent picric acid are the etching reagents most widely used.

Microstructure of Pure Metals.—When a properly prepared sample of a pure metal is examined under the microscope it is generally found to be made up of irregular polyhedric grains as shown in Fig. 1, which represents a drawing of the structure of pure gold under a magnification of 50 diameters.

It will be noticed that many of the grains are hexagonal, which strongly suggests that gold crystallizes in the regular cubic system, these hexagonal grains being probably due to interfering cubes and octahedra.

Many pure metals, including iron, crystallize in the cubic system, and exhibit, therefore, a structure similar to that of gold.

The dark net work shown in Fig. 1 marks the junction lines between adjacent grains. It is made apparent by suitable treatment of the polished surface, generally by immersing it in some acid, the acid corroding the metal more deeply between the grains than over their surface.

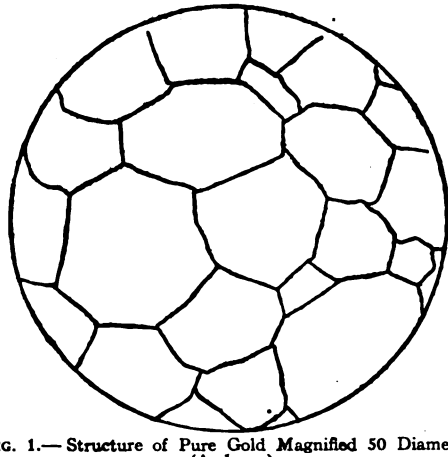

FIG. 1.— Structure of Pure Gold Magnified 50 Diameters (Andrews).

These grains of which pure metals are composed are not single-crystals. If the polished sample be etched more deeply and examined under higher power, it will be found that each grain is made up of a great number of small crystals, frequently cubic. It will be found, moreover, that all these small cubes which make up a single grain are oriented in the same direction in the same grain, but that their direction changes as we pass from one grain to another.

The size of the grains varies with the nature of the metal, some metals being made up of much larger grains than others, even when cast and solidified under exactly the same conditions.

The presence of impurities, sometimes of an extremely small amount, frequently exert a powerful influence on the size of the crystalline grains, some impurities increasing it, others reducing it.

The size of the grain in the same metal is also greatly affected by the temperature to which the metal is heated and from which it is allowed to cool, and by the rate of cooling. Generally speaking, it may be said that the higher the temperature, the larger the grain, and also that the slower the cooling the larger the grain. These results might have been anticipated, if it be considered that slow cooling from a high temperature are conditions favorable to the formation and growth of crystals.

Undisturbed cooling is a necessary condition to the free development of crystals. If the metal be agitated while solidifying, and worked—that is, subjected to powerful mechanical pressure — while cooling from a high temperature, the formation of the crystalline grains will be greatly hindered, if not altogether prevented, the metal assuming an amorphous-like structure, hence the important influence of work upon the structure of metals.

The Microstructure of Pure Iron.— Pure iron is not a commercial product. It can only be obtained in small quantities by carefully conducted laboratory manipulations, and even with the most refined care it is quite impossible to produce it absolutely pure. The purest commercial iron is of Swedish origin and may contain as much as 99.8 per cent of iron.

When a sample of this iron is properly prepared and examined under the microscope, some regions may be found which are absolutely free from slag and from carbon, and which exhibit, therefore, the crystalline structure of pure iron, or, at least, of carbonless iron. (See Fig. 2). It will be noted that this structure is very similar to that of gold shown in Fig. 1. Like gold, it is made up of polyhedric grains, generally hexagonal. Iron like gold and like many other metals crystallizes in the cubic system.

Ferrite.— Pure iron, or rather carbonless iron, considered as a microscopical constituent, has been called ferrite, a name which suggests its nature and which was proposed by Prof. Henry M. Howe. This constituent necessarily makes up the whole mass of carbonless iron, while in low carbon steel and in gray cast iron ferrite occurs in decreasing amounts as the percentage of combined carbon increases.

The physical properties of ferrite are evidently those of carbonless iron. It is, therefore, soft, being easily scratched by a needle, a test which will occasionally be found useful by the metallographist. It is moderately strong, having a tensile strength of some 50,000 pounds per square inch. It is very ductile, its elongation amounting to 20 or more per cent. Ferrite does not possess any hardening power since carbonless iron cannot be hardened by sudden cooling from a high temperature.

The Microstructure of Commercial Wrought Iron. Longitudinal Section.—The

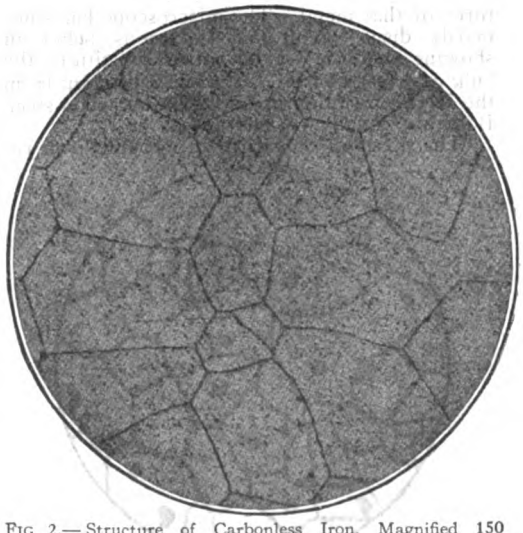

FIG 2.— Structure of Carbonless Iron, Magnified 150 Diameters Ferrite (Longmuir).

microstructure of the longitudinal section of a wrought iron bar is shown in the accompanying illustration (Fig. 3). The ground mass or matrix of the metal will be found to be made up of polyhedric crystalline grains similar in every respect to the crystalline grains of pure iron and of pure metals in general. Many

irregular black lines, varying much in thickness and length, but all running in the same direction, will also be noted in Fig. 3. These lines indicate the location of the slag which is always present in commercial wrought iron, and which assume the shape of streaks or fibres running

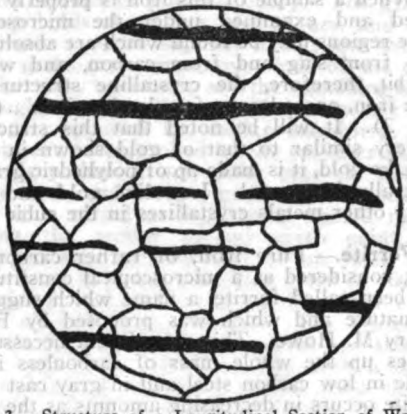

FIG. 3.— Structure of a Longitudinal Section of Wrought Iron, Ferrite and Slag (Longmuir).

in the direction of the rolling or forging, thus imparting a fibrous appearance to the metal. Wrought iron then is made up of a mass of ferrite, as might have been anticipated, assuming its characteristic crystalline structure, and of numerous elongated particles of slag.

It was thought for many years that wrought iron actually had a fibrous structure, and indeed, the number of persons who still hold this view is surprisingly large. Many valuable properties were attributed to puddled iron on account of its "fibrous structure" which were denied to steel because of the "crystalline structure" of that metal. The miscroscope has summarily disposed of this erroneous belief in showing that the ferrite which constitutes the bulk of wrought iron is in no way different from the ferrite forming the bulk of low carbon steel. Both are equally crystalline.

The presence of carbon in wrought iron re-

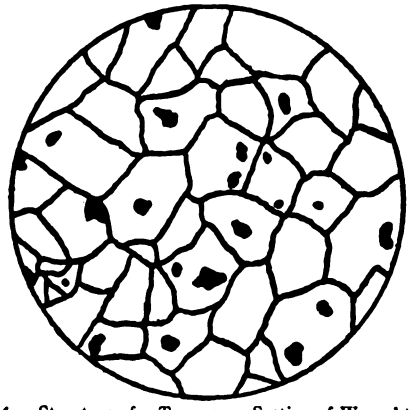

FIG. 4.— Structure of a Transverse Section of Wrought Iron Ferrite and Slag (Longmuir).

sults in the occurrence of another constituent (pearlite) to be described later.

Transverse Section.—The microstructure of the transverse section of a wrought iron bar is shown in Fig. 4. Like the structure of a longitudinal section (Fig. 3), it consists in a mass of crystalline grains of ferrite. The slag, however, which in the latter section occurred as fibres running in a direction parallel to the rolling, here assumes the shape of irregular, dark areas, which correspond to the cross-sections of the slag fibres.

The Microstructure of Low Carbon Steel. — If a small amount of carbon be introduced into molten iron and the resulting product cast, the metal is converted into what is known as low carbon steel. From the fact that it was obtained in a molten condition it will follow that, unlike wrought iron, it is quite, if not altogether, free from slag. The absence or presence of slag constitutes the most distinct difference between wrought iron and low carbon steel, for these two metals may otherwise have identical chemical composition and very similar, if not identical, physical properties.

The microstructure of very low carbon steel is illustrated in Fig. 5. It will be noted that it consists in a mass of ferrite; that is, of carbonless iron, made up of polyhedric crystalline grains very similar to the ferrite constituting

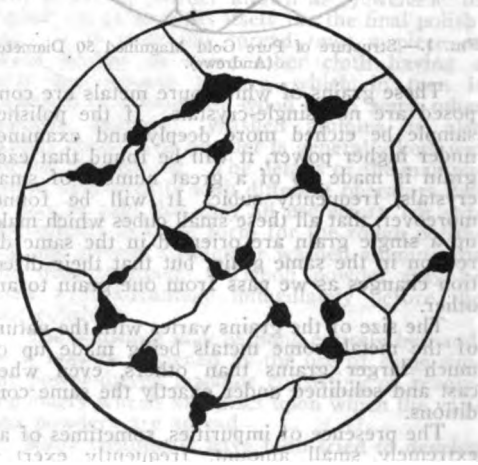

FIG. 5.— Structure of Low Carbon Steel. Carbon 0.08 per cent Ferrite and Pearlite (Arnold).

the bulk of wrought iron. At the junction lines of many ferrite grains, however, some dark areas will be seen, which indicate the presence in the metal of another constituent. Since ferrite does not contain any carbon, it is evident that all the carbon present in the steel has segregated into these small dark masses, and thus we arrive at the interesting conclusion that in low carbon steel the carbon is not disseminated all through the mass, as might reasonably have been expected, but that it gathers in small particles embedded in a mass of iron.

Pearlite.—Speculating as to the nature of this new constituent, we know that it cannot consist of pure carbon; for it is known that the carbon present in steel does not exist in the free state, but is combined with some iron, forming the carbide or iron Fe_3C. This iron carbide must necessarily be located in the dark areas, but are these made up exclusive of this carbide? To assist us in determining the character of this constituent, let us examine it under a high magnification. We then find that each dark particle breaks up into two components

(Fig. 6), which occur as small parallel plates alternately bright and dark. As to the nature of these components, it is evident that one of them is the carbide Fe_3C and the other must necessarily be iron or ferrite; for these are the only two constitutents which, to the best of our knowledge, are present in unhardened steel.

Dr. Sorby, who was the first observer to describe the appearance of this interesting constituent, proposed for it the name of "pearly constituent," because it frequently exhibits a display of color very suggestive of mother of pearl, especially when viewed by oblique illumination. Later Professor Howe suggested the name of pearlite, which has been universally adopted.

Cementite.— The carbide Fe_3C has been called cementite, also by Professor Howe, because it occurs abundantly in cemented steel, merely owing to the fact that this steel is generally a high carbon steel. Pearlite then is a mechanical mixture of ferrite and cementite after the fashion described in the preceding paragraphs.

It should be stated here that pearlite does not always assume such a distinctly laminated structure. In many instances its structure remains ill-defined or assumes a granular rather than a lamellar appearance, this being due chiefly to the treatment to which the steel has been subjected.

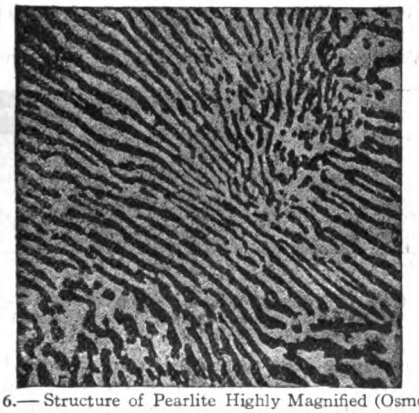

FIG. 6.— Structure of Pearlite Highly Magnified (Osmond).

A high magnification is required for the resolution of pearlite, generally not less than 200 diameters. The samples should also be very carefully etched

The Microstructure of Medium High Carbon Steel.— The microstructure of steel containing 0.38 per cent of carbon is illustrated in Fig. 7 under a magnification of 100 diameters. It will be noted in comparing this structure to that of low carbon steels (Fig. 5), that the introduction of more carbon in the iron has resulted, as should be expected, in the presence of a greater amount of pearlite and of a correspondingly smaller proportion of ferrite. The pearlite occupies now roughly about one-third of the total area. Under sufficiently high power the pearlite areas exhibit the characteristic lamellar structure illustrated in Fig. 6.

On further addition of carbon, the amount of pearlite, which is evidently proportional to the percentage of carbon, increases correspondingly, as shown in Fig. 8, which illustrates the microstructure of steel containing about 0.59 per cent of carbon. The pearlite occupies here over one-half of the total area. It will be noted that the ferrite areas are not resolved into polyhedric grains, apparently because the ferrite now occurs in particles often too small to be made up of several crystalline grains. The

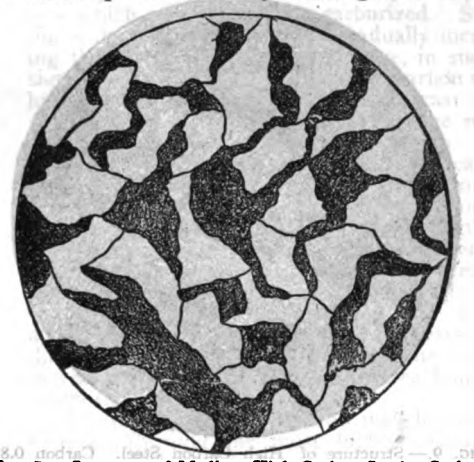

FIG. 7.— Structure of Medium High Carbon Steel. Carbon 0.38 per cent Ferrite and Pearlite (Arnold).

internal structure of these small masses of ferrite, however, is still made up of small cubic crystals as previously described. A high-power photomicrograph of this steel would reveal the laminations of the pearlite shown in Fig. 6.

The Microstructure of High Carbon Steel. — It has been shown that the introduction of an increasing amount of carbon in steel results in the formation of a correspondingly increasing proportion of pearlite and decreasing amount of ferrite. A degree of carburization, therefore, must necessarily be reached, when the whole mass will be made up of pearlite, the ferrite having finally disappeared. This critical point

FIG. 8.— Structure of Medium High Carbon Steel. Carbon 0.59 per cent Ferrite and Pearlite (Arnold).

in the structure of steel is attained when the metal contains about 0.85 per cent carbon. In exceptionally pure steel a little more carbon may be required to cause the complete disappearance of ferrite, while in the presence of much impurity a smaller percentage may be sufficient.

Steel made up exclusively of pearlite is sometimes said to be saturated, it is also called "eutectic," or "eutectoid," steel, the latter term having been suggested by Professor Howe. If it contains less than 0.85 per cent carbon,

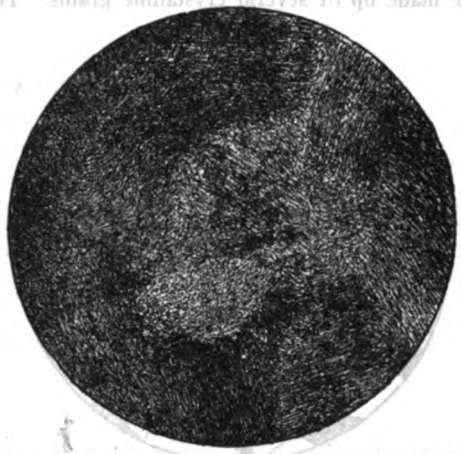

FIG. 9.— Structure of High Carbon Steel. Carbon 0.89 per cent Pearlite (Arnold).

and, therefore, an excess of ferrite, it is called under-saturated or "hypo-eutectoid" steel, while if it contains more than this amount of carbon (and therefore, as will be seen, an excess of cementite) it is called over-saturated or "hyper-eutectoid" steel. The use of the terms eutectic and eutectoid implies that steel is considered as an alloy of two constituents, ferrite and cementite, which, upon cooling, gives rise to the formation of a third constituent, pearlite, made up of small particles of both components. Many alloys contain a constituent possessing the same characteristics and which is called "eutectic alloy."

The structure of steel made up exclusively of pearlite is shown in Fig. 9. The magnification is not sufficiently high to show clearly the laminations of pearlite.

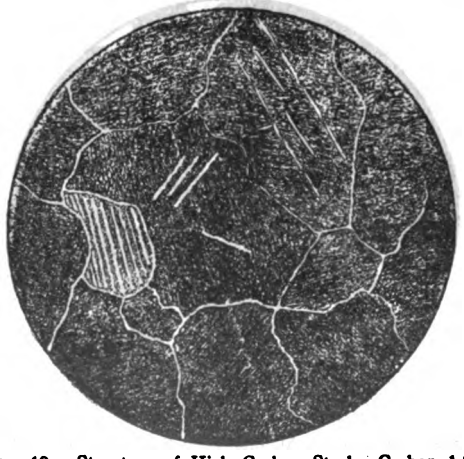

FIG. 10.— Structure of High Carbon Steel. Carbon 1.20 per cent Pearlite and Cementite (Arnold).

Let us now consider what effect a further addition of carbon will have upon the structure of the metal. Fig. 10 is the reproduction of a drawing showing the structure of a steel containing 1.20 per cent carbon, or much more carbon than the amount required to convert the whole mass into pearlite. It will be noted that while the bulk of the metal is still made up of pearlite, it now contains also another constituent, which in Fig. 10 occurs chiefly as a light net work surrounding the meshes of pearlite. This structure recalls that of medium hard steel and an inexperienced eye might be led to infer that this light constituent is ferrite. This net work, however, consists of cementite which is now present in excess over the amount required to form pearlite, just as in the case of low carbon steel, ferrite was in excess.

Cementite has a more metallic lustre than ferrite and remains bright and structureless even after prolonged etching, while ferrite is colored and resolved into grains after such treatment. Cementite is extremely hard and stands in relief in the structure, while ferrite is soft and is depressed by the polishing. Ferrite is readily scratched by a needle, while cementite cannot be marked. The excess of cementite, however, does not always assume the shape of a fine net work, its mode of occurrence depending upon the treatment to which the steel is subjected.

With further increase of carbon, the amount

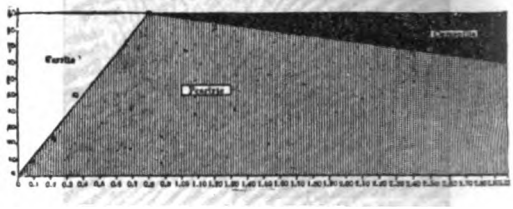

FIG. 11.— A Graphical Representation of the Relation Between the Carbon Content and the Structural Composition of Iron-Carbon Alloys.

of cementite will necessarily increase and the proportion of pearlite decrease correspondingly.

The structure of unhardened carbon steel just described may, for our purpose, be accounted for as follows: The carbon present in the steel unites with a portion of the iron to form the carbide Fe_3C or cementite (which contains 6.67 per cent carbon). The remaining iron, or ferrite, and this cementite then unite structurally in definite proportion to form pearlite, leaving, as the case may be, an excess either of ferrite or of cementite, the former in low carbon steel, the latter in highly carburized steel.

The changes in the structural composition of steel, due to changes in the percentage of carbon, may be represented graphically as shown in Fig. 11.

This diagram clearly illustrates the fact that if no carbon be present the whole of the metal is made up of ferrite, and that by introducing increasing amounts of carbon, pearlite is formed in increasing quantity, while ferrite decreases correspondingly. With 0.85 per cent of carbon the whole mass consists of pearlite. Further addition of carbon results in the introduction of cementite in the structure, which then increases in amount with the carbon, while the proportion of pearlite decreases.

In our description of the structural compo-

sition of steel we have purposely ignored the effect of impurities, because while their influence is not to be overlooked, quantitive information on this point is lacking

The Microstructure of Cast Iron.— Cast iron may be sharply divided into two classes: (1) White cast iron and (2) Gray Cast Iron, that is, into cast iron free from graphitic carbon and cast iron containing graphitic carbon. The microstructure of these two varieties of cast iron will be considered separately.

The Microstructure of White Cast Iron.— Like steel, white cast iron is free from graphitic carbon; it contains the whole of its carbon in the combined condition, that is, as the carbide Fe_3C or cementite. We should, therefore, ex-

FIG. 12.— Structure of White Cast Iron Magnified 150 Diameters Pearlite and Cementite (Longmuir).

pect to find the microstructure of white cast iron very similar to that of high carbon steel, that is, made up of pearlite and a large excess of free cementite. In Fig. 12 is shown under a magnification of 56 diameters the structure of a sample of a white cast iron, and it will be seen that, as just anticipated, it is composed of pearlite and cementite, roughly in equal proportions. This iron contained about 3.50 per cent of combined carbon, which theoretically would call for about 45 per cent of free cementite. A higher power would as usual be required to resolve the structure of the pearlite areas.

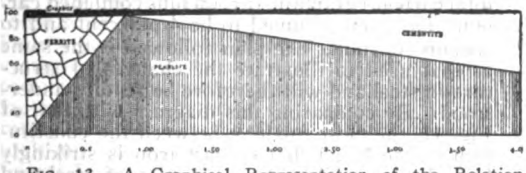

FIG. 13.— A Graphical Representation of the Relation Between Percentage of Combined Carbon and the Structural Composition of Cast Iron.

The close analogy which exists between the structure of steel and that of white cast iron is, therefore, evident. Indeed it is not possible to distinguish high carbon steel from white cast iron by the examination of the structure of these metals; nor is this possible by any other test. To distinguish between high carbon steel and white cast iron, we must necessarily adopt an arbitrary rule, consisting, for instance, in calling steel, all carburized iron containing less than 2 per cent carbon and cast iron, those products which are more highly carburized. Starting with carbonless iron and gradually increasing the carbon content, we produce, in succession, low carbon steel, medium high carbon steel, high carbon steel, and finally white cast iron, without any suggestion as to when the metal ceases to be steel and becomes cast iron. The changes of structure and of properties caused by this gradual increase of carbon are continuous and do not indicate any abrupt transformation. As the carbon increases the strength of the metal increases until the carbon content reaches about 1 per cent and then it decreases; the hardness increases and the ductility and weldability decrease continuously; the malleability decreases and finally disappears, but these changes occur gradually as the carbon increases and not abruptly upon reaching the composition of white cast iron.

To sum up, white cast iron may be considered as forming the most highly carburized member of the steel series.

The Microstructure of Gray Cast Iron — Gray Cast Iron free from Combined Carbon. — Perfectly gray cast iron does not contain any combined carbon. It should, therefore, be made up of a mass of carbonless iron (ferrite) and of a certain amount of graphitic carbon. The graphite occurs as numerous plates irregular in shape and size, disseminated through the iron, and breaking up its continuity. (See Fig. 14). It is because of this breaking up of the continuity of the metallic mass that the original ductility and malleability of the iron is so completely destroyed by the presence of a sufficient amount of graphite.

Gray Cast Iron Containing Combined Carbon.— Gray cast iron is seldom free from combined carbon. It generally contains from 0.10 to 1 per cent and even more of carbon in the combined condition, and it is well known that this percentage of combined carbon depends chiefly upon the amount of silicon present and upon the rate of cooling of the casting. Various proportions of combined carbon, and, therefore, of graphitic carbon impart different appearances to the fracture of cast iron, which was, and still is to a considerable extent, classified accordingly into the various grades "No. 1, 2 and 3 Foundry," "mottled," "forge," etc.

The presence of some combined carbon in the iron must necessarily imply the presence of some pearlite in its structure. The metallic matrix which in perfectly gray iron consists of ferrite now possesses the structural characteristics (and therefore the properties also) of a low carbon steel. Gray cast iron containing a small amount of combined carbon may be considered as a low carbon steel whose continuity is destroyed by the presence of numerous plates of graphite. Such an iron would correspond to a No. 1 Foundry.

The presence of a larger proportion of combined carbon must necessarily result in a correspondingly greater amount of pearlite in the structure.

By increasing the percentage of combined carbon in cast iron, we convert its metallic

matrix into steel of a correspondingly higher carbon content. We must necessarily reach a point, therefore, when the matrix will become a mass of pearlite, or, in other words, when it will assume the character of a saturated or eutectoid steel. This will occur when the metal contains about 0.70 per cent of combined carbon. It will be remembered that in the case of steel some 0.85 per cent of carbon was required to convert it into a mass of pearlite. In the case of cast iron, however, the amount of iron to be saturated is less (because of the space occupied by the graphite) and requires a correspondingly smaller amount of carbon, namely, some 0.70 per cent.

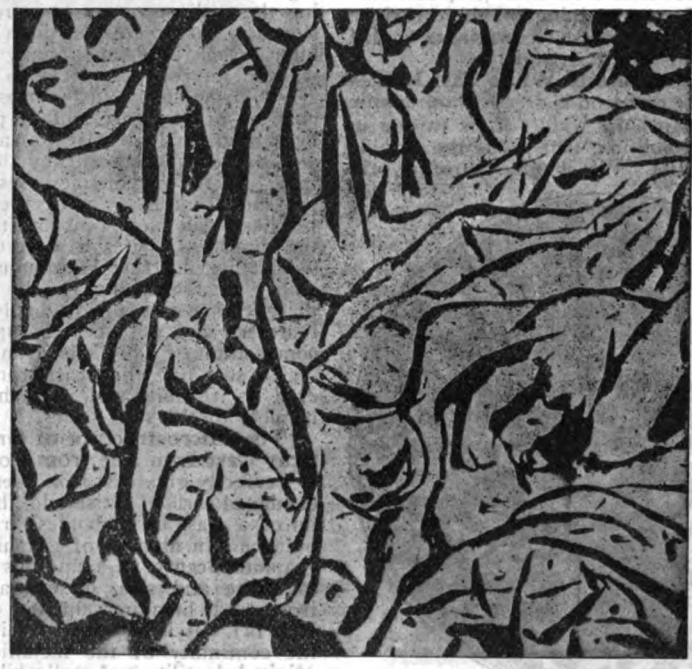

FIG. 14.—Gray Cast Iron free from Combined Carbon, Magnified 100 Diameters (Langenberg).

FIG. 15.—Gray Cast Iron Containing Combined Carbon, Magnified 500 Diameters.

Classified by its fracture, a cast iron of this character would correspond to a No. 3 or 4 Foundry.

A further increase of combined carbon would result in the presence of some free cementite in the structure. Such cast iron is known, from the appearance of its fracture, as "mottled" iron. The structure of gray cast iron is illustrated in Fig. 15; it consists of a matrix of pearlite, numerous plates of graphite and of a white constituent which in iron containing considerably less than some 0.70 per cent combined carbon would correspond to ferrite, while in iron containing a considerably greater percentage of combined carbon it would indicate the presence of cementide.

Relation Between the Structure of Cast Iron and the Percentage of Combined Carbon.—The relation between the structural composition of cast iron and the proportion of combined carbon may be clearly illustrated by the diagram of Fig. 16, in which the percentage of total carbon (graphitic carbon plus combined carbon) has been assumed to be 4 per cent and to remain constant. The plan followed is the same as that used to illustrate the changes of structure in steel and will therefore be readily understood. By comparing this diagram with that of Fig. 11, the close analogy between the constitution of steel and that of cast iron is strikingly brought out. That the properties of steel and cast iron, in spite of this similarity, differ so much is due to the presence of graphitic carbon which by breaking up the continuity of the steel mass greatly decreases its strength and ductility, and deprives it of its malleability.

The structure of iron and steel briefly described in the foregoing paragraphs is that

assumed by these metals on slow and undisturbed cooling from a sufficiently high temperature. It may be called the normal structure, time and opportunity having been given for the formation of the final and, generally, stable constituents. The treatments, thermal and mechanical, to which iron and steel are so frequently subjected, however, in the manufacture of finished implements may alter these structures very profoundly by preventing, in part or in all, the formation of the normal constituents and causing the formation and retention of new constituents, thereby imparting to the metals widely different properties. Indeed it is this sensitiveness of steel to thermal treatments that makes possible the manufacture of implements varying so widely in properties —from extreme hardness to great softness, from great strength combined with little ductility to moderate strength combined with great toughness and ductility, etc.

Metallographical studies include also the construction and interpretation of thermal curves and equilibrium diagrams, the application of the phase rule to metallic alloys, as well as other closely allied scientific determinations.

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IRONBARK TREE, an Australian tree (*Eucalyptus siderophloia*), so named because of its very hard bark. The tree reaches a height of from 80 to 100 feet and about 3 feet in diameter at the base. The wood is highly prized for shipbuilding, having the requisite qualities of durability and hardness to a very high degree.

IRONCLAD. See ARMOR-PLATE.

IRONCLAD OATH, The, an act passed by the United States Congress in 1866, which had the effect of excluding voters, in the States lately in rebellion, from the franchise. The act practically disfranchised all Southerners over 25 years of age. It was repealed shortly after its passage.

IRONDALE, ī'ern-dāl, Wash., a place in the northeastern part of Jefferson County, a few miles south of Port Townsend. The first blast-furnace on the Pacific Coast was erected at this place in about 1880. The furnace was in operation about 12 years, and was then abandoned because of the great expense incurred in production. The ore was obtained from Texada, an island belonging to British Columbia, and 130 miles distant. The last of the 19th century the Pacific Steel Company, a corporation in which practical iron-makers of Pennsylvania are the chief owners, began investigations as to the nature of the ore, and the possibility with improved machinery, to manufacture iron at Irondale or vicinity at paying rates. As a result the Pacific Steel Company took up the work abandoned by the Puget Sound Iron Company. The works were so improved as to be practically new, and 20 brick charcoal kilns were erected for the use of the company. Coke is obtained in Washington.

IRONS, or BILBOES, shackles of iron into which the ankles of a prisoner are fixed, and which slide on a long iron bar. Refractory prisoners, who evince violent behavior, are commonly put in irons. In case of extreme violence, the wrists may be similarly treated. The punishment of "putting in irons" has been abolished in the United States navy.

IRONTON, ī'ern-tŏn, Ohio, city, county-seat of Lawrence County; on the Ohio River, and on the Detroit Southern, the Norfolk and Western, and the Cincinnati, Hamilton and Dayton railroads about 100 miles directly southeast of Columbus. The Chesapeake and Ohio Railroad, in Kentucky, maintains a ferry for passengers and freight, which gives the city the benefit of four important railroads. Ironton was settled in 1832, and for some years was known as a river-trading town. It was incorporated in 1849, and owns municipal waterworks. It is situated in a section of country noted for its clay (suitable for pottery), iron ore, and bituminous coal. Its chief industrial establishments are foundries, rolling-mills, blast-furnaces, machine-shops, nail-works, furniture factories and planing-mills. It has also among its manufactures doors and mantels, stoves, boilers, cement and fire-bricks. The clay in the vicinity is much used for pottery. The parks, River View, Lincoln and Beechwood, are attractive. Some of the principal buildings are the Briggs Public Library, the Kingsbury school, Odd Fellows' Hall, Masonic Temple, City hospital and several churches. Ironton was the home for some time of the artist Sarah Cotter-King. Pop. 13,147.

IRONWEED, a genus, *Verononia,* of tall, coarse, composite plants, several species of which grow abundantly in woods and along roadsides throughout the eastern and southern parts of the United States. They bear heads of magenta-colored flowers somewhat like miniature thistles. The most conspicuous species (*V. altissima*) is often 10 feet high, and blooms in August and September. A large number of species occur in the tropics of North and South America and of Africa.

IRONWOOD, Mich., city in Gogebic County, on the Wisconsin Central and the Chicago and Northwestern railroads; about 12 miles south of Lake Superior and 33 miles southeast of Ashland. It was settled in 1884 and incorporated in 1887. It is situated in a region rich in iron ore and timber; the section is known as the "Gogebic iron region." The famous Norrie mine is in this vicinity. Ironwood is the trade centre for the greater part of the mining and lumbering business of the county. Some of the principal buildings are the Carnegie library, the city-hall, the high school and several churches. Trolley lines connect the city with Gile and Hurley, Wis. The government is vested in a mayor, who is elected annually, and a council. The mayor appoints, subject to the approval of the council, all the subordinate officials except the members of the board of education. Pop. 14,500.

IRONWOOD, a popular name for many trees whose timber is very hard and heavy. Probably the best known species in America is also known as leverwood, *Ostrya virginiana,* of the family *Betulaceæ,* indigenous from Nova Scotia to Florida and westward to Minnesota and Texas. It is a medium sized tree with furrowed bark, birch-like foliage, pistillate flowers in catkins resembling the female flowers of hop,

hence its popular name hop-hornbeam. The name ironwood is also sometimes applied to *Carpinus caroliniana*, of the same family. (See HORNBEAM). Among foreign "ironwoods," perhaps the most widely known is *Mesua ferrea*, an East Indian tree planted around Buddhist temples for its fragrant flowers, which are used to decorate the images of Buddha. Another Asiatic species is *Metrosideros vera*, from which the Chinese and Japanese make rubbers. In Australia and South Africa various species of *Olea, Melaleuca, Sideroxylon, Notelaea*, and *Myrtus* are valued for their timber, locally called ironwood, employed where great toughness is desirable and weight no obstacle.

IRONY, a peculiar mode of thought and expression in which the meaning of the speaker is contrary to his words. It is a delicate species of sarcasm and when skilfully used is one of the most crushing and irresistible figures of rhetoric. Instances are frequent in history and literature. One of the most celebrated is that recorded in Scripture, where Elijah taunts the discomfited priests of Baal on Mount Carmel. In philosophy the term has been used as a rule to characterize either the Socratic attitude whereby the only criterion for the æsthetic worth is found in the consciousness of the artist himself.

IROQUOIAN FAMILY, a linguistic stock of North American Indians deriving their name from the form Iroquois (q.v.), the name given to the "Five Nations." The Saint Lawrence River was probably their first habitat, and from there they gradually spread to the Great Lakes, primarily because of the hostility of the Algonquins. Cartier found, in 1535, a people living between Montreal and Quebec whose language showed them to be Wyandots, but 100 years later these had entirely disappeared and the Algonquins occupied their territory. The Iroquoian stock is divided into four groups: the northern — Wyandot, Tionontati, Wenrorono, Tohotænrat, Neuter, Hochelaga; the central — Mohawk, Oneida, Cayuga, Onondaga, Erie, Conestoga, Seneca; the southern — Tuscarora, Meherrin, Nottaway, Chowanoc, Coree; the Cherokee — Elati or Lower Cherokee, Middle Cherokee, and Atali or Upper Cherokee. The tribes of the Iroquoian stock were all agricultural, and were noted for their houses and fortifications. They have also made considerable advance in education. The whole population is about 46,000, of whom 12,000 are in Canada. The major portion of the population are Cherokee. See IROQUOIS; CHEROKEE; WYANDOT; SENECA and ONEIDA.

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IROQUOIS, or **MATILDA**, Canada, port of entry in Dundas County, Ontario, on the Grand Trunk Railway and the Saint Lawrence River, 20 miles southwest of Cornwall and 45 miles southeast of Ottawa. It is one of the termini of the Iroquois Canal. Pop. 849.

IROQUOIS (ĭr-ō-kwoi') **LEAGUE**, the name given by the French to the confederacy of North American Indians, called by the English the "Five," and afterward the "Six Nations." By the Delawares they were known as the Mingwe; by the Algonquins as Nadowa; by the Powhatan as Massawomekes. The Mohawks, Oneidas, Onondagas, Cayugas, Senecas, and Tuscaroras, after they were driven from their hunting-grounds in North Carolina in 1712, were the members of this confederacy. They called themselves Ongwanonsionni, "the people of the long house." They formerly resided on the Mohawk River in New York State and on the lakes which still bear their names, and extended their conquests to the Mississippi and beyond the Saint Lawrence. Their valor and successes had procured them the name of the Romans of America. Their territory abounded with lakes well stored with fish; their forests were filled with game, and they had the advantage of a fertile soil. The sachems owed their authority to public opinion; the general affairs of the confederacy were managed by a great council, composed of the chiefs, which assembled annually at Onondaga. The history of the Iroquois dates back to 1535, when Cartier found the peoples who had settled along the shores of the Saint Lawrence River, from Quebec to Montreal, and who, judging from the similarity in languages were undoubtedly the ancestors of the later Iroquois. The Algonquins, who at this time were more powerful, drove those people from their habitations and scattered them throughout the country, some, like the Hurons, traveling west, and the majority, among whom were the Iroquois, going south, settling mainly in North Carolina. Hiawatha, their leader, persuaded them to form a league or confederacy for their own protection. The league thus formed and afterwards known as the "Five Nations," was based upon such sound and well-ordered plans that it is in existence at the present time. In 1712 they were driven from their territory in North Carolina and coming north again settled in Central and Western New York. Here they gathered other tribes and merged them into the confederacy. In 1715 they took in the Tuscaroras, after which the league was known as the "Six Nations." They bought firearms and supplies from the Dutch and gradually strengthened themselves so that in 1630, they took the offensive in a long and bloody war against the Algonquins, first attacking the French missions among the Hurons in Canada and either slaying, capturing, or sending into exile all this tribe. They then rapidly subdued the Neutral Nation, the Erie, the Ottawa, and tribes of the Algonquin race; and conquered in quick succession the Conestogas in the south, those east of the Hudson, among whom were the Mohicans, and the Miami and Illinois tribes of the Middle West, the only tribes who successfully opposed them being the Ojibwas of the Northwest and the Cherokees of the South. In the long wars between the British and the French, which continued with some interruption for nearly a century, until 1763, they were, with a few exceptions in the British interest. These exceptions were notably the Cayugas and the Mohawks, over whom the French Jesuit missionaries exercised a great influence, and who later withdrew from the league and settled in the villages of Caughna-

waga and Saint Regis. In the Revolution the Iroquois as a league were neutral, but the separate tribes took up the warfare generally in favor of the British, the Oneidas and some of the Tuscaroras being the only ones who sided with the Americans. Brant led the Mohawks and Cayugas into Canada, where, at the end of the war, the Canadian government gave them several reservations, and where a majority of them are at the present time. The reservations for the Iroquois in the United States are mostly in New York, where all now live except a part of the Oneidas, who in 1820 migrated to Wisconsin, and a small band of Senecas, who have a small reservation in the Indian Territory. According to the United States census, and a Canadian report, the total number of the Iroquois in 1902 was about 17,000, of whom about 8,000 were in the United States. Since then the Iroquois have increased somewhat. Numbers of them have left the reservations and gone out to take their place in the world. Those still classed as Iroquois are Gibson (Ontario, Canada) 140; Mohawks of Bay of Quinte (Ontario, Canada) 1282; Oneidas (Thames, Canada) 776; Grand River Six Nations (Ontario, Canada) 4,195; Caughnawaga (Quebec) 2,082; Saint Regis Iroquois, 1,435; Two Mountains Indians, 399; New York reservations, 4,918; Wisconsin Oneidas, 2,107; Oklahoma Senecas, 215. See SIX NATIONS, THE; IROQUOIAN FAMILY.

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IRRADIATION, *in physics,* an apparent enlargement of a bright body when seen against a background darker than itself. A simple method of observing this phenomenon is to view a bright sky through the spaces between a grating. If the breadth of the opening can be made equal to the breadth of the bars of the grating it will be seen that, when viewed from a little distance the bars look narrower than the spaces between them. This is obviously owing to the encroachment of the light upon the dark spaces around it. The first question to arise and one which was long discussed was whether the encroachment was due to an excitation of the nerves of the retina outside the limits on which the light fell upon the nerves, or whether it was necessary that the light should actually fall outside of its geometrical limits. The latter view is found to be the correct one, unless in cases of extreme brilliancy of the light.

The phenomenon was explained by Plateau as due to the extension of the impression upon the nerves of the retina beyond the outlines of the image. Helmholtz, however, has ascribed it to the want of a perfect accommodation in the eye, leading to the formation of a diffiusion images about the proper image of a bright object, so that it encroaches upon the dark space about it, and hence appears larger than it really is. Still another explanation is offered: Irradiation is almost entirely in the nature of an optical defect or aberration of light. It begins with the atmosphere, which, when light passes through long stretches of it, slightly deflects the rays, so that a point is no longer seen as such, but as a small ill-defined waving surface. No lens ever brings the rays from a point to exactly the same focus. The lenses of the eye itself have defects which everyone who consults an oculist is acquainted with. The result of all these imperfections is to produce the enlargement we have described.

Irradiation is a notable subject in the history of astronomical observations. It was necessarily larger with the imperfect telescopes of former times than with the improved ones of our own period. Total eclipses of the sun, the transits of Venus and Mercury were especially productive of the phenomenon. The enlargement of the moon resulted in a star appearing as if within the bright disc of the moon when its light was really only grazing the surface. The sharp points or horns of light formed by the limb of the sun during the transits of Venus and Mercury were rounded off, so as to present quite an illusory view of their form. Just at the beginning and end of total eclipses of the sun the phenomenon known as Bailey's beads, really enlargements of the last points of light from the sun's limb, which could be seen before the sun was quite covered, looked like a string of beads. Many learned memoirs have been written on the subject, but the consensus of opinion to-day is toward the simple and comprehensive theories above mentioned. "Irradiation" is also a name applied to the act of emitting beams of light, illumination, brightness emitted, and by extension, en-lightenment.

IRRADIATION, *in physiological psychology,* a term borrowed from physics and extended to include cases of nerve stimuli, and the impulses of these stimuli from the normal path. As a word, "irradiation" is equivalent to the German word *Ausstrahlung,* the French term *irradiation,* the Italian, *Irradiazione,* and the Spanish word, *irradiacion.* All these forms except the German were derived from the (quasi) Latin *irradiatio* (*n*), from Latin *irradiare,* meaning "to irradiate." More fully defined, irradiation is the lateral diffusion of nervous stimuli out of the path of normal nervous stimulated discharge, as a result of which the excitation of one peripheral end-organ may excite other central organs more than those directly correlated with it or anatomically related to it by direct nervous connections. Where it takes place is not yet certainly known. Dogiel has shown that in skin areas subject to great irradiation, the end organs of one order are connected by communicating rami, suggesting peripheral irradiation. There are also indications of excessive stimuli in the spinal cord. It has been suggested by Herrick that irradiation (or at least a very nearly similar and analogous process), is at the foundation of most

pleasurable sensations. Consult Dogiel, A. S., 'Die Nervenendigungen . . . des Menschen' (in Arch f. mikr. Anat. XLI, 1893); Herrick, C. L., 'Modern Algedonic Ideas' (in *Journal of Compar. Neural*, V, March 1895).

IRRATIONAL NUMBERS, those which are not integers or fractions; numbers which are incommensurable with unity. This $\sqrt{2}$ is an irrational number. The ratio π of the circumference of a circle to the radius is an irrational number — 3.1415. Incommensurable roots of numbers, like $\sqrt{2}$, are called surds. The irrational numbers are divided into algebraic, involving only extraction of roots, and transcendental, involving higher processes. Consult Dedekind, 'Essays on Number,' translated by Beman (Chicago 1901).

IRRAWADDY. See IRAWADI.

IRREDENTISTS, an important modern Italian patriotic and political movement having for its avowed aims the "freeing" of alleged Italians and lands near Italy, and the incorporation of both within the Italian political dominion. The English word "Irredentists" is derived from an Italian name "Italia irredenta," or "unredeemed Italy" which natives apply to that territory and its inhabitants.

Irredentism, the principles, policies and the practice of Irredentists, gained an ascendency in Italian politics for the first time during the five or six years following 1878. Among its ardent disciples were members of the older Italian Radical and Republican parties, adherents whose main activities in support of Irredentism are confined, chronologically, within the last quarter of the 19th century. Having attained this temporary recognition, the forces behind Irredentism subsided, and after 1881 a long period of unruffled repose followed, save that manifest in specious oratory or political fanfaronade. Politicians from time to time circulated a resurrected form of Irredentism; but their procedure in these cases was based upon an affected fear of Austrian, French, or other aggression. The revival of present day Irredentism took place in 1908, during which year the ambitious ideal, "L'Idea Nazionale," first saw light. "L'Idea Nazionale" is the end toward which the new Italian patriotic party of the Nationalists tend: and these Nationalists have restored the Irredentism of their fathers, and it re-emerges from the past in union with elements which its former upholders never knew, again to court the adherence of Italians. Irredentism is the core of "L'Idea Nazionale."

Dante, pioneer of the Italian classical Renaissance, early treated his fellow countrymen to a magnificent vision of a united Italy. He helped to prepare their minds for the reception of Irredentism and L'Idea. After the Russo-Turkish War a conference of the powers was held at Berlin, and the award they made to Austria in 1877 disappointed Italy keenly. The vision of Dante was fresh in Italian memory: and in 1878 Irredentism appeared. Its adherents were to unite — they said — all portions of Italy, even all those parts which of old had passed beneath the sway of foreign power. In language they asserted they had found a touchstone which would reveal what belonged to Italy, what to a foreign power. Resting their claims upon this doubtful criterion, they suggested that France, Austria, Switzerland and England should surrender such territory to Italy. In this way they included all within the confines of Görz, South Tyrol or Trentino, Istria, Trieste, Tessino, Nice, Corsica and Malta. Their test appears, however, to have been applied in an arbitrary manner and even in cases where it was not applicable. For the Italian language is not spoken universally in South Tyrol, Görz and Istria; while Malta has its own dialect; and Dalmatia is non-Italian, although it once acknowledged the dominion of the old Venetian Republic.

Austria did not yield to the Irredentists, and retained Trieste and the Southern Tyrol. In 1866 the great Italian general Giuseppe Garibaldi had temporarily conquered Trentino: and on this fact united with their linguistic principle they of Irredentist conviction found sufficient inducement to direct most of their operations against Austria. Over these territories both Italians and Austrians adopt the same opinion. Both with equal plausibility urge that the Trentino is a weak point in the armor of the owner, and "enclave," and a territory which if wholly abandoned by one power to its neighbor, must expose the power making such surrender to the possibility of a dangerous attack upon its integrity.

When in 1881 France, to the chagrin of Italy, occupied Tunis, Italian operations against Austria subsided. Thereupon the Italian government entered into those relations with Austria and Germany which originated the Triple Alliance, and Irredentism entered upon a period of repose which lasted a generation.

The great European crisis of 1908 culminating in Austria's annexation of Bosnia-Herzegovina marks the awakening hour of "L'Idea Nazionale." "L'Idea" is the aspiration, really, of a refined Imperialism; it engenders aggression and expansionist ideas. So profound is the hold of "L'Idea" upon the heart of its votaries, that it finds expression even in such unsuspected avenues as those offered by art. Its spirit enlivens such highly artistic productions even as that of Gabrielle d'Annunzio, who wrote his 'La Nave,' or the 'Ships,' to extol the might and the glory-making conquests of fallen Venice. In contrast with the Irredentism out of which it has developed, the new spirit embodied in "L'Idea" exhibits features such as no Irredentist ever knew. Irredentists were not quintessentially Imperialists, but the Nationalists are. Nor did Irredentism glorify war, as war. Professor Corrodini, a noted Nationalist, is proud in that he is a "profound admirer of war!" Georgio del Vecchio, another great Nationalist grows ecstatic over "the goodness of war!" While the Nationalist, Prof. Scipione Sigbele, one of the party's most respected spokesmen, points out the course for his followers in words like these: "The war question is for Nationalists the primordial question. The warlike virtues are for us the primordial virtues!" It is interesting to note that all the foregoing utterances were made prior to the late great European conflagration.

The last two decades have witnessed a whole series of acute eruptions of human energy. It is quite possible that these have affected the sub-

stitution of "L'Idea Nazionale" for the older Irredentism.

Professor Sighele finds reason to characterize the new spirit as a "voluptuousness of self-sacrifice," while another Nationalist eulogizes his followers because: "L'Idea Nazionale" is a purely "realist and integral valuation of international relations in absolute antithesis to the sentimental tendencies of the old Radical and Republican Irredentism which looked to the abandonment of the Triplice and the rapprochement of Italy with the parliamentary powers of the west."

It may be mentioned, however, that while the above claim advanced by Signor Federzoni may be capable of substantiation, it obviously stands in need of it. For to an impartial observer the pronounced syndicalism of a wing of the Nationalist party amounts to a betrayal. And it is sufficient to call attention to it that their subjective individualism is anything rather than a genuine, an objective realism. The most pronounced distinction making Irredentism differ from its successor, finds sharpest expression, probably, in the grounds and methods assigned for their respective efforts. No citizen of a power whose territory is involved in the intentions of these Italian parties can be expected to see in these intentions any profound difference. And because these intentions are the same, Sighele recalls how the party to which he belonged welcomed their ideal "vibrant with an enthusiasm at first judged ridiculous." No thoughtful independent observer can expect a Realism in any genuine sense to proceed from the co-operation merely of the moods and of the emotions.

After the Tripolitan expedition in 1911, a congress of Nationalists gathered at Florence. Here they codified their characteristic doctrines, and in a sensational manifesto established their central organ, *L'Idea Nazionale*. Then they banded themselves together in a definite body, "L'Associazione Nazionalista." And as the storm impended over Europe prior to the arrival of the great European War of 1914, an announcement appeared in *L'Idea Nazionale* which reveals how the Association met the crisis. On 10 May 1915, the paper told its readers:

"Italy desires war in order to obtain Trent, Trieste and Dalmatia. The Nation desires it. A nation which has opportunity to free its lands should do so as a matter of imperative necessity."

Let one note the phrase to "free its lands," the lands in question being meanwhile identified with Trent, Trieste, Dalmatia. The intentions of Nationalism are those of Irredentism, and one party is a continuation of the other.

During the war "L'Idea" once came near realization. Cadorna's victorious soldiers had swept 122 communes constituting 10 political districts clean of Austrian troops. Eight districts were organized and functioning before the close of 1916. They were under a Commissario or civil representative of the Italian supreme military command. After Caparetto the territory was again in Austrian hands until vacated by the latter under the terms of the armistice which went into effect 4 Nov. 1918. See ITALY AND THE WAR.

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P. W. HAUSMANN.

IRRIGATION, the watering of land by artificial means to increase crop production. This method of agriculture is widely practised in the western or arid portions of the United States, as well as in the drier parts of the Old World. It necessitates the application of many of the principles of hydraulic engineering (q.v.) and in addition requires for success a knowledge of agriculture and related economic matters. The western third of the United States, as well as the greater part of Mexico on the south and portions of Canada on the north, has an average annual rainfall of less than 20 inches, with the result that relatively few crops can be raised by dependence upon the natural supply of moisture. There is on the whole a far larger extent of dry land than can ever be provided with sufficient water for maturing crops. Thus land values, in a large way, depend upon the ability to obtain water; many other industries besides agriculture can be developed only in localities where an artificial water supply can be had. Large investments have been made in irrigation works in the arid West with the result that there has been a steady increase in the area of land made useful. Beginning with a few hundred thousand acres in 1880, by 1890 the irrigated area had increased to approximately 4,000,000 acres, in 1900 to 8,000,000 acres, and in 1910 to 15,000,000, representing a total investment of approximately over $300,000,000. The hydraulic works for conserving and distributing the scanty water supply have been built to a point where all of the easily available sources of water have been utilized. Future progress must necessarily be relatively slow and expensive because of dependence upon works of increasing magnitude and cost per acre served. This cost, beginning originally with $15 or $20 per acre from small canals built by farmers, has increased to an average of about $50 per acre for supplies obtained from the larger and more difficult undertakings such as the Roosevelt Reservoir in Arizona and the Arrowrock Dam in Idaho.

The most notable advances in irrigation development were made possible by the passage of the Reclamation or Newlands Act, championed by Senator Newlands of Nevada and signed by President Roosevelt on 17 June 1902. (See RECLAMATION LAWS). The necessity for this act arose from the condition that a great part of the land to be reclaimed belonged to the national government; also from the fact that investments in the large privately owned irrigation works requiring water storage had not proved profitable. Under the terms of this act the proceeds from the disposal of public lands are set aside in a fund to be used in survey, examination, construction and maintenance

of irrigation works for the reclamation of arid and semi-arid lands. Under the terms of this act over $100,000,000 have been expended in construction of reservoirs, canals, hydro-electric plants and related works in the Western States. See UNITED STATES RECLAMATION SERVICE.

Water Supply.— Nearly 95 per cent of the lands irrigated in the United States obtain their water supply by gravity from surface streams. A relatively small, but valuable area, is watered from wells by means of pumps driven by steam, gasoline or hydro-electric power. Most of the streams of the arid region have their source in the high snowcapped or forested mountains from which they flow with rapid descent, passing usually through a series of upland valleys or parks and then cut their way through rocky defiles entering upon the lower valleys. In these the streams spread out and usually lose the greater part of their water in broad, sandy channels. The most effective development of the stream therefore is that in which the water is diverted near the upper edge of these lower valleys and carried out in channels so built as to conserve the supply which would otherwise be lost in the sandy channels.

Water is ordinarily diverted from the stream, not by lifting or pumping from the stream as sometimes inferred, but by taking advantage of the slopes of the country. For example, the streams on issuing from the mountains have a rapid fall of from 10 to 50 feet per mile or more. Water will flow with moderate rapidity in a well-built canal having a fall of one foot per mile or even less. Assuming then that the stream enters the valley on a descending grade of 10 feet per mile and the canal is started out alongside the stream with a fall of one foot per mile, at the end of 10 miles the canal will be 90 feet above the river and must necessarily have swung back away from the river to be upon supporting ground. Thus it results that the canal departs rapidly from the river and, following the contour of the slopes of the foothills, is in position to discharge water toward the river over or through the lands which lie below the canal.

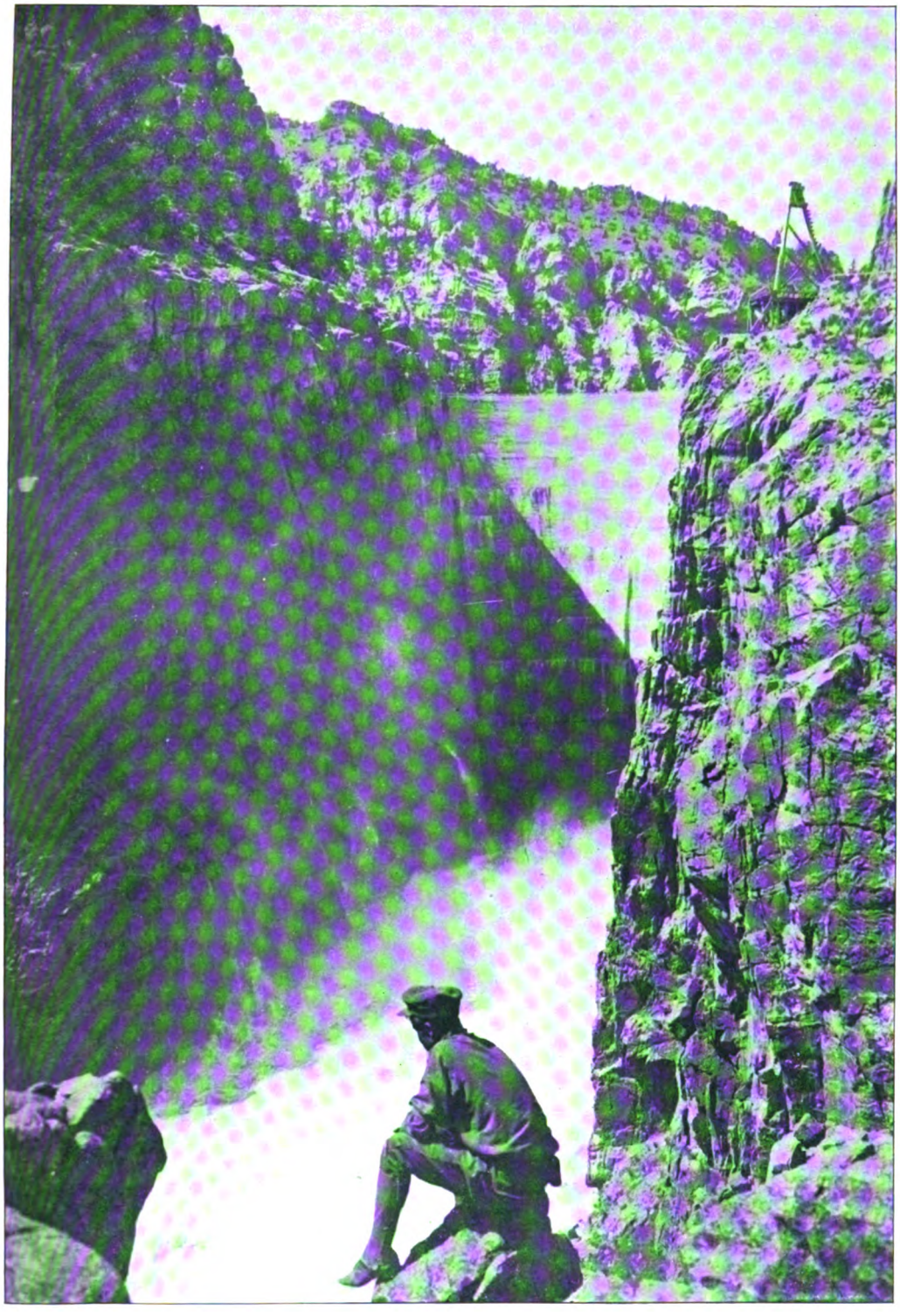
In order to facilitate the taking of water from the river into the canal, it is usual to provide a low overflow dam or weir which extends from the head gate of the canal across or diagonally into the channel of the stream. If the topographical conditions are favorable, this weir may be omitted, or in case of small irrigation canals where the owners are unable to provide a permanent dam, it is customary on the approach of the low-water season to build a temporary obstruction of stone and brush, turning the water toward the head gate. As the water continues to fall this is made more nearly impervious by adding straw, earth or sand bags. It is necessary to provide some form of head-gate to control the amount of water which enters the canal. Otherwise in time of flood the excess might overtop the canal banks and wash them away. Head-gates are also needed to regulate the quantity in accordance with the needs of the irrigators. These usually consist of stout walls and frame built of timber, masonry or concrete with sliding gates of wood or steel. The water enters usually under the gates, the quantity being controlled by raising or lowering these.

The canals leading from the head-gates usually pass through a rocky or rough country, involving large expense in construction before the more nearly level open land is reached. In this upper part of the course it is sometimes necessary to carry the water in tunnels through projecting cliffs or to provide suitable timber, metal or masonry flumes to take it across rough country. When once the canal is out upon the agricultural land it is usually excavated with broad, shallow sections, keeping the water surface as high as possible consistent with safety, so that water may be diverted to the adjacent fields on the lower side of the canal. The fall or slope of the canal, taken in connection with the cross-section, is so proportioned as to give a velocity in ordinary earth of a little over two feet a second — not enough to erode the sides and bottom nor so stagnant as to deposit silt usually carried by mountain streams. Considerable skill and experience is required on the part of the designing engineer to lay out the canal system and its laterals or distributing branches so as to avoid erosion and sedimentation.

When the fall of the canal is so great that it is impracticable to allow the water to flow freely down the slope, devices known as drops are introduced. These consist of timber, concrete or masonry foundations and walls within which the water can drop to a lower level without injury to the canal. Drops are usually built with a sharp overfall edge and a low dam or obstruction below the fall in order to maintain the pool or water cushion. Occasionally they are made in the form of an incline, with a pocket at the bottom to break the force of the falling water.

It is necessary in the construction of nearly every irrigation canal to take water across a depression at some point in its course. This is usually done by means of a wooden or metallic flume or long box, usually rectangular or semi-circular in cross-section and supported above the ground by a frame or trestle of timber or metal. Such flumes are often used across rocky or sliding ground where it is impracticable to maintain a canal. This is particularly the case near the head, where the water, after being taken from the river, is often carried along a narrow, steep-walled cañon. Here the foundation for a flume is prepared along the rocky cliffs, supports being devised to suit the inequalities of the ground. One type of flume is that having a semi-circular section and built of narrow planks or staves laid side by side and held in place by iron bands run around the flume, joined by nuts and threads by which the bands can be drawn up and the staves brought together. In crossing very deep depressions it is necessary to have a correspondingly high trestle in order to carry the flume across the grade. Such high trestles are expensive and liable to destruction from storms. In their place there have been built inverted siphons, made of wooden stave-pipe, or aqueducts of other form. The stave-pipes are similar in construction to the semi-circular flumes of narrow plank, being carefully wrought to a given dimension and held in place by circular iron bands or hoops.

In some portions of the arid region when an abundant supply cannot be had from surface streams or reservoirs, it may be practicable



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SHOSHONE RIVER DAM, 328 FEET HIGH. SHOSHONE CANYON, WYOMING

One of the many big dams used in the irrigation and reclamation of former untillable land in the Northwest

to obtain some of the needed water by digging or boring wells, especially at points near stream-channels or along the foot-hills. Out on the broad valleys it may be necessary to go to a depth of from 100 to 300 feet or more before reaching moisture. Where the supply of water from wells is ample, various devices have been employed, such as windmills, gasoline and steam engines and electric power for bringing it to the surface. It is very important to continue the well borings through the water-bearing sands or gravel, so as to take advantage of the full thickness of the pervious deposits. Perforated pipe is often driven into the layers of coarse gravel and adds greatly to the capacity of the well. Artesian or flowing wells may be found wherever water is held under pressure in pervious material overlaid by clay or tight shale. In such a well the water will rise to a height equal to the line of saturation of the gravel or pervious stratum in its outcrop in the surrounding country. Artesian conditions occur in nearly every State, but they do not extend over any considerable portion of the country, excepting on the Great Plains and in the broad valley of central California. Wherever they occur the water has especial value on account of the convenience incident to its rising above the surface. In some places, as the James River Valley of South Dakota, the pressure is 100 pounds or more to the square inch, throwing the water to a considerable height and enabling the wells to be used as sources of power. The quantity of water to be had from deep wells is governed by the diameter of the well, the structure and thickness of the water-bearing rocks and the pressure sustained by the water. With relatively dense rocks a slight head of water will throw only a feeble stream, but from thick layers of open gravel or sand rock large volumes are delivered. It frequently occurs that a four-inch pipe will deliver all of the water which can reach this point, and increasing the diameter of the well will not alter the flow.

While the volume of well water used in irrigation is small compared to that obtained by gravity from flowing streams, yet, as regards value, it may be said that some of the most important sources of irrigation supply are utilized through pumping. The force of flowing water itself is frequently employed to bring water up to the level of the irrigable land, the bucket-wheel having been utilized from the earliest historical times up to the present. An important source of power for pumping water is the wind. Over the broad valleys and plains of the arid region the wind-movement is almost continuous for days and weeks. It is a comparatively simple and inexpensive operation to sink a well into the water and erect a windmill, attaching this to a suitable pump. A windmill once erected on the plains is operated day and night by the wind, bringing to the surface a small but continuous supply of water. This small stream if turned out on the soil would flow a short distance, then disappear into the thirsty ground, so that irrigation directly from a windmill is usually impracticable. To overcome this difficulty it has been found necessary to provide small storage reservoirs or tanks, built of earth, wood or metal, to hold the water until it has accumulated to a volume sufficient to permit a stream of considerable size to be taken out for irrigation. Such a stream, flowing rapidly over the surface, will penetrate to a distance and cover an area much greater than is possible with the small flow delivered by an ordinary pump. One disadvantage connected with the use of windmills is that most of them are constructed to operate only in moderate winds. As the strength of the wind increases, the wheel begins to revolve, increasing in efficiency until the velocity of the wind is about 8 or 10 miles an hour. At greater speed the mills are usually so constructed that the efficiency decreases rapidly as the wind becomes more powerful. When it approaches a gale, the mill stops completely.

Although there are in use large numbers of windmills in pumping water for irrigation of small tracts, the aggregate area is small compared with the extent of lands watered by more powerful devices, such as those made possible by the development of hydro-electric power. Within the past decade much attention has been given to this matter, particularly in connection with the use of power developed for municipal and manufacturing purposes and which is available for farm use at seasons or times of day when not needed for the principal industry. It is possible at such times to obtain power at low rates and to utilize it in pumping water for agricultural purposes.

Application of Water.— The methods of irrigation practised in various parts of the United States differ according to the climatic conditions and soil, and especially with the early habits or training of the irrigators. Water is applied to the irrigated field usually in one of three ways — by flooding, by furrows and by sub-irrigation.

Flooding.— This is done by the check system or by wild flooding. By the latter process the irrigator turns the water from a lateral or distributing irrigation ditch over a level field and completely submerges it. Perfectly level fields are, however, comparatively rare, and the first step in primitive agriculture by irrigation has been to build a low ridge around two or three sides of a slightly sloping field, so that the water is held in ponds. These low banks are commonly known as levees or checks. In construction they are frequently laid out at right angles or more often following the contour of the ground dividing the land into a number of compartments. Water is turned from the irrigation ditch into the highest of these compartments, and when the ground is flooded the bank of the lower side is cut or a small sluice-way opened, and the water passes into the next field, and so on until each in turn is watered.

Furrows.— Irrigation in checks has gradually decreased in relative importance owing to the expense of leveling and leveeing the ground. With experience the irrigator has become able to apply water to crops which are cultivated in furrows without resorting to such expensive means. The furrows are plowed in such a direction that the water when turned into them from the lateral ditches will flow freely down them without washing away the soil. When the water has completely filled the furrows, and has reached the lowest points,

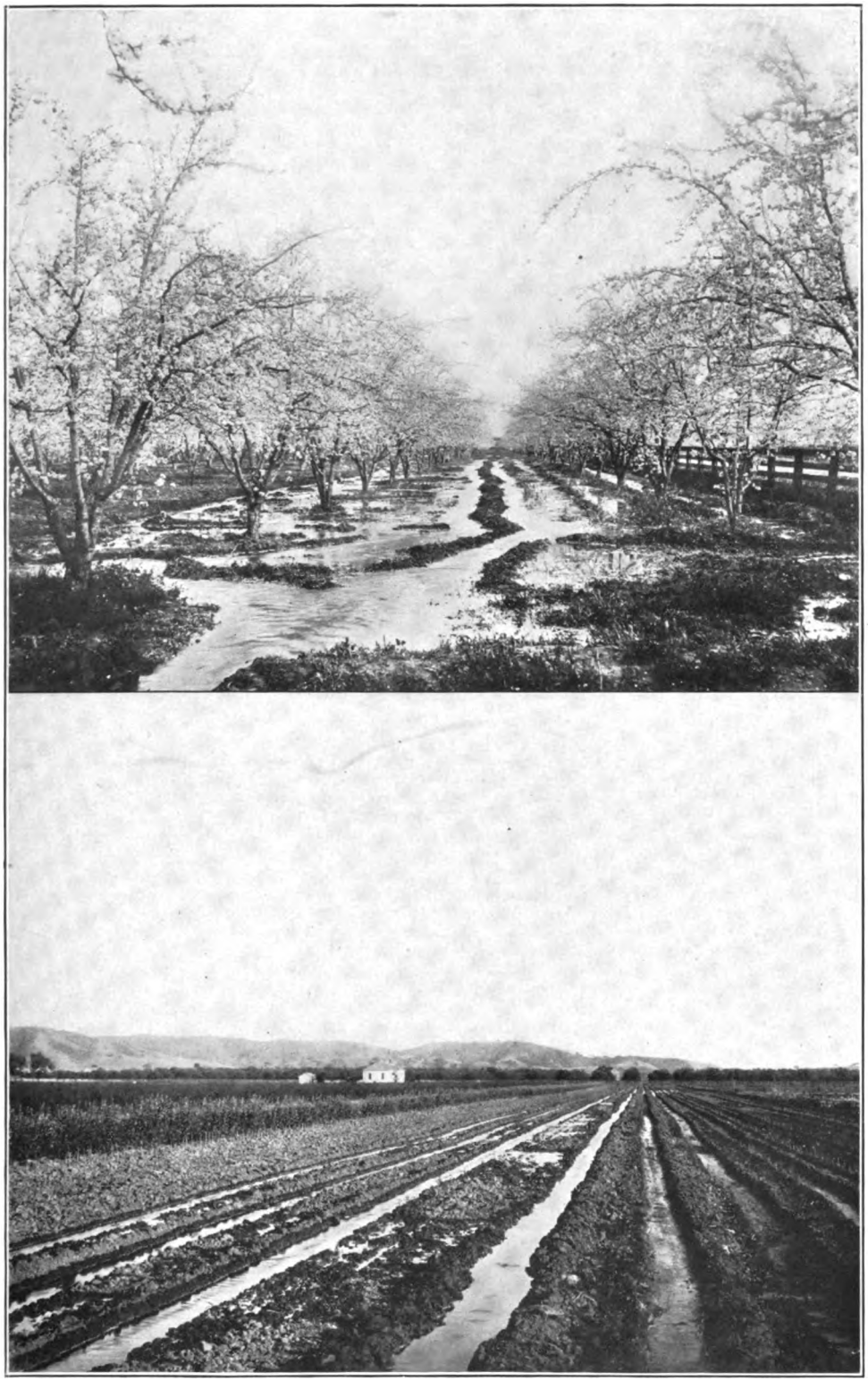
the little streams are cut off and turned into another set of furrows. The methods of doing this differ. Sometimes the irrigator simply cuts the bank of the distributing ditch with a shovel and then closes the opening after sufficient water has escaped. A more systematic method is employed in California. Water is carried to the upper end of the furrows in a small box-flume with openings about one inch square in the side. These openings are closed by shutters and a number can be opened at once, permitting a certain quantity of water to escape into each furrow. The slope given the furrows determines to a certain extent the amount of water received by the soil. If the fall is very gentle, the water moves slowly and a large portion is absorbed while the furrow is being filled. If steep, the water quickly passes to a lower end and the ground does not absorb so much. When the entire field has been watered the furrows are usually plowed out and a thin layer of the top soil stirred to make an open, porous covering or mulch, preventing excessive evaporation and allowing the air to enter the ground. Without such cultivation a hard crust may be formed. The loosening of this crust breaks the capillary connection with the moisture beneath and thus lessens the loss of water. For irrigating small grain the fields, brought to a uniform surface, are thoroughly cultivated, and after the grain has been sown, small parallel lines are made similar to furrows, but smaller and nearer together. These tiny channels are made either by a suitable drag or by a roller upon which are projections so arranged as to make small grooves in the soil. These are made in the direction of the desired slope, so that the water can flow down the marks through the grain as it would in furrows through a cornfield. The rapidly growing grain shades the surface and prevents the formation of crust, rendering subsequent cultivation unnecessary. In order to cause the water to spread from the lateral ditches into the furrows through the ground, use is made of a canvas dam or tappoon — a small sheet of metal of such shape as to fit across the ditch. This can be forced into the soft earth, making a small dam and causing the water to back up and overflow the field of grain.

Furrow-irrigation is usually employed in watering trees and vines. In some localities, however, basin or pool irrigation is practised. Where water is especially scanty and correspondingly high-priced, the supply is conducted in cement-lined ditches and by wooden flumes as near as possible to the trees and vines and is then turned out into the furrows ploughed around or near as possible to the trees and vines. The water issuing from small apertures in the side of the wooden box falls into the furrows and is immediately conducted to the vicinity of the trees. Care is usually taken that the water shall not actually touch the tree trunks and that it reaches the extremities of the roots to encourage these to spread outward. After the water has traversed the furrows to the lower end of the orchard, the supply is cut off and the ground is tilled as soon as the surface dries sufficiently.

Sub-irrigation.— Attempts have been made to conduct the water beneath the surface immediately to the roots of the trees, thus preventing waste by evaporation from the surface of the ground. Few devices have been successful, owing to the fact that the roots of the trees rapidly seek and enter the openings from which the water issues, or, surrounding the pipe by a dense network, cut off the supply. Porous clay tiling has been laid through orchards and also iron pipes perforated so as to furnish supply of water along their length. In orchards where sub-irrigation has been unsuccessful because of roots stopping-up minute openings beneath the surface, the system has been reconstructed and water has been brought to the surface at or near each tree by means of small hydrants. Vertical pipes are placed at short intervals leading to the level of the ground, and in these are small iron gates or shutters so arranged that the flow can be cut off in the buried pipe and forced to rise and overflow the surface of the ground near each tree. For annual or root crops sub-irrigation has been successfully practised by the use of tile or of small metal pipes partly open at the bottom, allowing a small amount of water to escape. These are laid 12 inches or more beneath the surface and are connected with lines of tile or clay pipes leading from the reservoir or source of supply. As the crops are removed each year and the ground cultivated, the roots have no opportunity to stop up the pipes. The term sub-irrigation is occasionally applied to conditions occurring in nature where water percolates freely beneath the ground for a considerable distance sufficiently near the surface to supply the need of crops. Where the sub-soil transmits water freely, irrigation ditches may sub-irrigate large tracts of country without rendering them marshy. Thus farms may obtain an ample supply of water from ditches half a mile or more away without the necessity of distributing small streams over the surface. In the San Joaquin Valley, Cal., vineyards in certain localities are thus maintained in good condition, although water has not been visibly applied for many years.

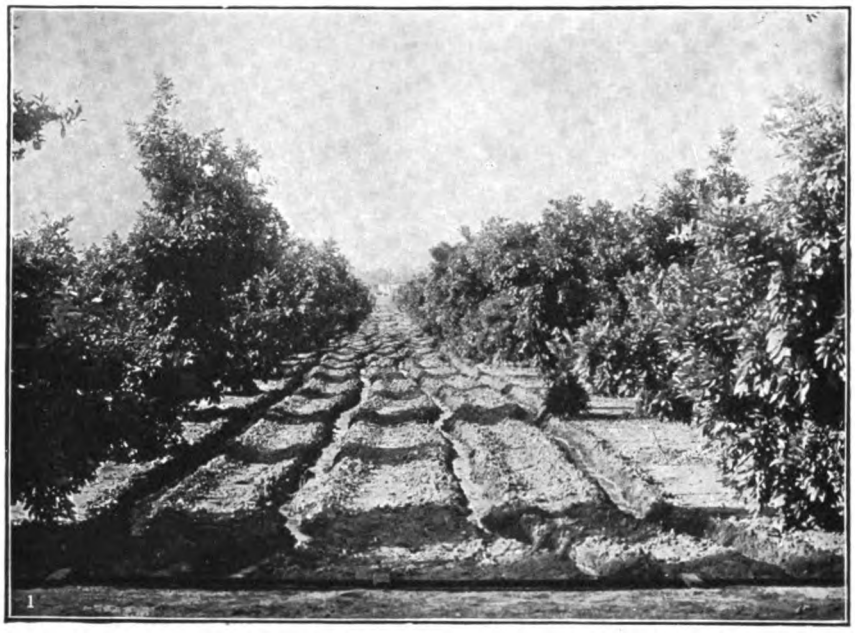
Quantity of Water.— The amount of water required for raising crops varies according to the character of the soil. The plants themselves need a certain minimum supply, but a far larger quantity is required to saturate the surrounding soil to such a degree that the vitalizing processes can continue. Agricultural investigators have found by direct measurements that from 300 to 500 pounds of water or even more are required for each pound of dry matter produced. When the ground is first irrigated a large quantity of water is sometimes required to saturate the subsoil. The water turned upon the surface and absorbed during the first year or two has frequently been equivalent to an amount sufficient to cover the ground to a depth of 10 or 20 feet, and in many cases an amount equal to a depth of five feet or more per annum has been thus employed for several years. Gradually however the dry soil is filled. The pioneers of irrigation usually apply too much water to their fields, often to their disadvantage.

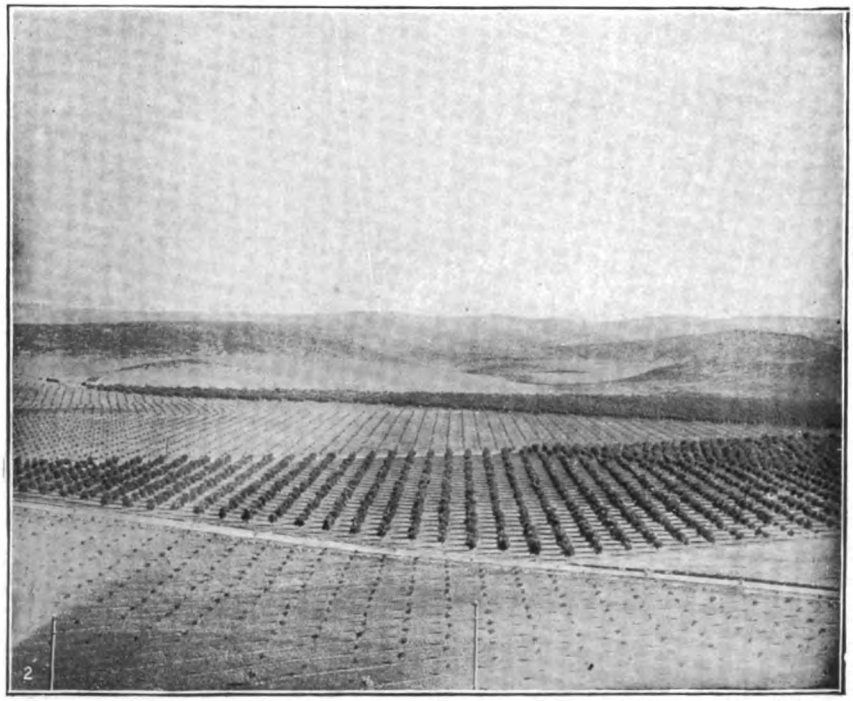
The quantity of water used in irrigation is usually stated in one of two ways: (1) In terms of depth of water on the surface; (2) in



1 Irrigating a Prune Orchard, Santa Clara Valley, California

2 Irrigation in Pajaro Valley, California





1 Scene in Southern California, Showing the Furrow Method of Irrigation
2 Desert Land Reclaimed by Irrigation, Showing Recently Planted Orchards

quantities of flowing water through the irrigating season. In the humid regions the rainfall is usually from three to four inches per month during the crop season. In the arid region, where the sunlight is more continuous, and the evaporation greater, there should be for the ordinary crops at least enough water during the growing season to cover the ground from four to six inches in depth each month or from a third to half of an acre-foot. The second method of stating the quantities necessary for irrigation is of convenience when considering a stream upon which there is no storage. It is estimated that one cubic foot per second, flowing through an irrigating season of 90 days, will irrigate 100 acres. One second-foot will cover an acre nearly two feet deep during 24 hours, and in 90 days it will cover 180 acres one foot deep, or 100 acres to a depth of 1.8 feet, or 21.6 inches. This is equivalent to a depth of water of a little over seven inches per month during the season of 90 days or about one and three-quarters acre feet. Successive years of deficient water supply notably in southern California have served to prove that, with careful cultivation, crops, orchards and vineyards can be maintained by using very small quantities of water. In some cases an amount not exceeding six inches in depth was applied during the year, this being conducted directly to the plants and the grounds kept carefully tilled and free from weeds. As estimated by various water companies in southern California, one miner's inch of water will irrigate from 5 to 10 acres, the miner's inch equaling 12,960 gallons in 24 hours, or almost exactly 0.02 second-foot, this being the amount delivered under a four-inch head, measured from the centre of the opening. Under this assumption one second-foot should irrigate from 250 to 500 acres. If it is assumed that one miner's inch is allowed for 10 acres, or one second-foot for 500 acres, this quantity of water flowing from May to October, inclusive, will cover the ground to a depth of a little over seven-tenths of a foot. With alfalfa flooding is practised, using upwards of half an acre foot to an acre; with small grains the water in less quantity is run in furrows; while with orchards the water is sometimes applied directly to each tree, or in furrows, four or five being plowed in parallel lines between two rows of trees.

Duty of Water.—The amount of land which can be irrigated with a given quantity of water, or the relation which these bear to each other, is commonly expressed by the term duty of water. The investigation of the duty of water is one of the most complicated problems of irrigation. There is such a difference in methods of measurement, soils, crops, climatic condition, ways of application of water, and frequency of watering that the statements made by different persons are almost irreconcilable. In general, more water is used, or the duty is less, on the newer land than on that which has been cultivated by irrigation for some years. The rainfall also affects the quantity used, and as this is exceedingly irregular, the amount of water applied each year fluctuates. Seepage likewise complicates matters, for a field may often receive considerable water indirectly and require less by direct application. The duty of water is quoted at from 50 to 500 acres or more to the second-foot. For convenience the unit of 100 acres to the second-foot has been considered as indicating careful irrigating, although in the more southwestern portion of the arid region this would be considered low, and in the northern part high.

Since the value of water per second-foot varies largely with its duty, it will be recognized that this value is exceedingly difficult to estimate. However, it is necessary to arrive at certain averages in order to approximate the possible values of a river, or of a reservoir, in the future development of the country. It has been estimated that a perpetual water-right is worth from $25 to $50 per acre in a grain or grazing country, and as high as from $100 to $500 per acre for fruit land, rising in southern California for the best citrus lands even to $1,000 or more per acre. Assuming an annual supply of water as being worth $50 per acre irrigated and a duty of 1 second-foot to 100 acres, this quantity would be worth $5,000 and a stream furnishing a steady supply of 500 second feet would have a value to the community of $2,500,000. Considering stored water as having a value of $100 per acre of reclaimed land, producing fruit or other valuable crops and with a duty of two and one-half acre feet of stored water to each acre, then a storage reservoir holding 250,000 acre feet would justify an expenditure of $10,000,000.

Alkali and Drainage.—The excessive use of water in irrigation above referred to is a source of injury not only through the loss of the valuable life giving fluid but because this when in excess produces swampy conditions, reducing or preventing crop growth and, in many localities, causing a development of alkali upon the surface. Taking the arid region as a whole from 15 to 20 per cent or more of the agricultural lands formerly irrigated have been abandoned because of waste of water, much of which was largely preventable. The alkali consists of mixtures of various kinds of earthy salts in different proportions, the most common of these consisting mainly of sulphate of lime or gypsum, known as white alkali or of sodium carbonate generally known as black alkali because of the burned appearance of the soil where it has been brought to the surface. In addition there are usually found in the alkali the ordinary table salt, chloride of sodium, salts of magnesium and similar minerals. These have been set free by disintegration of rocks, but owing to the scanty rainfall have not been washed away or leached out of the soil as has happened in more humid regions.

The accumulation of alkali in irrigated lands presents one of the most serious problems encountered in this method of agriculture. The injuries from the presence in excess of earthy salts are usually evident in the corrosive action on the tender bark, especially at the rootcrown. Experiments made in California show that apple trees are severely injured by the presence of 3,000 pounds of common salt per acre, this amount being disseminated through four feet in depth. On the other hand, the olive thrives where the soil contains as high as three tons of salt per acre, and the date palm flourishes on a soil so alkaline that hardly any other vegetable survives. Alfalfa, when young, is easily killed by alkali, but it has been found to thrive in soil containing as much as 6,000 pounds of common salt, 3,000 pounds of carbonate, and

over 1,000 pounds of sulphate, per acre, distributed through six feet of depth. Sugar-beets also have been known to grow well where a large amount of alkali is present. Grapes apparently are little affected by small amounts of alkali, while peaches and lemons are more susceptible to injury because of its presence. The recently introduced saltbush is notable for its ability to grow in alkaline lands, and sorghum and alfalfa, especially when the latter has reached maturity, are almost equally vigorous.

The most effective way of removing alkali is by under-drainage through tile laid at a depth of from three to five feet, the drainage-water being allowed to escape into a stream, or into a well from which it can be removed by pumping. The troubles caused by alkali yield to careful treatment. The tiling of land for relief from surplus water and for washing out the alkali costs little more than drain-tiling as practised on eastern farms. In the government demonstrations at Salt Lake City, Utah, where the percentage of alkali was very high, the lines of tile are 150 feet apart. The water descending into the soil dissolves large quantities of alkali near the surface and carries it off in solution. Land so tiled, even if badly alkaline, can be returned to profitable cultivation in time, if heavily irrigated, and within one year can be used for the production of some crops suited to the climate. Large areas of alkali land in the West may be reclaimed at a cost below the actual increase in the value of the land. Drainage-works are a necessary adjunct of irrigation. On bench-lands or gently sloping hillsides the water which escapes from one man's farm should be caught and used by his neighbor below, under good management none being left to stagnate, the surplus from the cultivated lands being often of great value in watering the lower meadows. There are many conditions where the question of disposing of the water is as important as that of obtaining it, particularly on the nearly level lands, where the subsoil has been filled to saturation by the water which has no opportunity to escape.

Cost of Water.— The first cost of water and the annual cost of maintenance form a very considerable item in the budget of the irrigator. As an equivalent for this expenditure he must expect to receive a return per acre for his crops greater than that obtained by the so-called dry farmer. As a matter of fact, he can raise few, if any, crops without irrigation, but with it he should be able to obtain a yield far in excess of the ordinary production because of his ability to control the water supply and to use it on a land upon which the sunshine is not cut off by frequent rain clouds. The cost of water is usually considered under two heads, *first*, that of the original investment in obtaining water by reservoirs, canals and distributing works, and *second*, the annual cost. The first cost ranges from $10 to $15 per acre, in case of the older and more easily built ditches, up to $50 or $75 per acre or even more where it has been necessary to provide expensive storage reservoirs or to overcome natural obstacles by building tunnels or masonry and concrete conduits. The average first cost of water in the United States is not far from $50 per acre. The commercial enterprises which have undertaken to build irrigation works have usually attempted to control the land reclaimed and to sell land and water together at a price of $100 per acre or more including some improvements in the nature of removing the native vegetation, leveling the soil and planting alfalfa. Without such control of the land, investments of this kind have rarely been profitable. In case of works built by the government the right to the use of water is sold at from $25 to $50 per acre or more according to local conditions, payable in 20 annual installments without interest. In a relatively few cases the land owners do not own a perpetual right, but rent water annually, but this condition, unfavorable for permanent development, is being done away with.

All irrigation works must be operated and maintained at an annual expenditure, this being a notable item especially where it is necessary to clean the canals and banks of large quantities of accumulated mud, weeds and so-called moss, and to make repairs of more or less temporary structures or to meet extraordinary conditions such as damages from floods or cloud-bursts. On the simpler individual or community systems, the cost may be 50 cents per acre per annum especially where the owners of the canals do the work themselves and are willing to submit to many inconveniences and occasional crop losses. On the larger, better managed systems where the works are kept in good condition, operation and maintenance may be from $1 per acre up to $1.50 or $2 per acre each year. In apportioning this charge it should be placed as nearly as possible on a metered basis, the payment for operation and maintenance being in proportion to the amount of water used in order to insure economy. As a rule too much water is put on the ground and it has been found that the least amount of water applied, consistent with fair plant growth, the larger and better the crop yields and less injury by seepage to the lands in the vicinity.

Crops.— In considering the character and value of the crops produced on irrigated land in the arid States and Territories, hay and forage form the most important item, being over one-third of the whole. Cereals — principally wheat, oats, rye and barley — come far below the forage crops; and next to these in order are vegetables, orchard fruits and small fruit. In California the orchard fruits surpass the forage crops in value. The large production of hay and forage under irrigation illustrates the fact that in these States irrigation is, to a large extent, an adjunct of stock-raising. The production of cereals under irrigation is relatively small. The total value of all the cereals produced under irrigation in the United States is less than that of those produced in almost any one of the humid States of the East; in New York, for example, though it is not considered a farming State, the value of the cereals raised is more than double that of the entire amount produced under irrigation in the whole country. In many localities the irrigation of cereals and staple crops has been brought about by local conditions, such as difficulty of transportation and consequent heavy cost of importation. The irrigated cereals in such localities are raised almost wholly for local consumption, and do not enter the markets of the world.

Users' Rights.— The first settlers frequently laid claim to the whole flow of the stream,

Soon after the first irrigation ditch was built others were constructed a few miles above or below. As long as the stream is of sufficient volume to fill each of the ditches, no difficulties from this arise; but sooner or later the increasing size and number of ditches and canals result in diminishing the flow in the river to such an extent that it becomes almost dry and water does not reach the ditches farthest downstream.

The result has been that in many parts of the arid region owing to scarcity of water, lawlessness has prevailed, and every man has endeavored to obtain for his own crops as much as possible of the scanty supply. Usually the irrigators elected a watermaster to apportion to each claimant a certain amount of water, or assign certain days or hours upon which water can be used. Often the quantity of the water has been settled only after vexatious lawsuits or neighborhood quarrels. In most parts of the arid region, the States have undertaken the regulation of disputes, and have created special boards or tribunals to consider the matter and to apportion the water. See WATER LAWS.

Economic Consideration.— Throughout the arid regions of the world irrigation is essential to agriculture and developments may be expected to proceed to the limits of the available water supply. In the more humid regions where occasional droughts reduce the crop value, it is being practised as an insurance. The developments have been slow, however, because of the fact that during wet years the tendency is to neglect the maintenance of the works and when drought conditions develop, the time has passed when water can be applied to the best advantage. The extent to which irrigation may be developed in the United States is being investigated by the United States Geological Survey through its systematic measurements of streams and studies of underground water. Not all of these sources can be utilized because of the great expense involved in building reservoirs, canals and other works, but with the settlement of the country and with greater skill and experience acquired in raising and marketing the crops there is a corresponding advance in land values and in the ability to pay for expensive undertakings. All of the easy or cheap schemes have been entered upon beginning with those which have cost only a few dollars per acre for the water and later increasing to expenditures of upwards of $50 or more per acre. These more expensive undertakings have not proved financially profitable to the investors because of the fact that the values created by the investment in canals and reservoirs have been widely diffused and have not been recoverable by the men who furnished the money. Because of this fact future development in irrigation must rest largely upon obtaining public funds or upon utilizing the credit of the communities which are benefited by the works — the direct losses of interest or profit on the investment being more than balanced by the indirect gains.

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IRRIGATION BILL, or RECLAMATION ACT, a Federal measure, approved 17 June 1902, for the reclamation by irrigation of arid and semi-arid lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming. The expenditures were to be met from the receipts from the sale and disposal of public lands in these States. Since the passage of the original act parts of it have been amended and repealed. Under this law there were expended up to 1916 some $100,000,000, resulting in the operation of 25 irrigation projects, capable of delivering water to more than 1,500,000 acres of which about 1,000,000 acres actually used irrigation. (See IRRIGATION). Consult James, G. W., 'Reclaiming the Arid West' (New York 1917); Teele, R. P., 'Irrigation in the United States' (New York 1915); United States, Department of the Interior, General Land Office, 'Laws and Regulations Relating to the Reclamation of Arid Lands by the United States' (Circular No. 102, Washington 1912).

IRRITABILITY, in plants, term designating phenomena, very interesting and curious, but very little understood. Such are the phenomena of what is usually called the sleep of plants; the motion of the spores of many cryptogamic plants by means of cilia; the motions of Oscillatoriæ, Diatomaceæ and others of the lowest Algæ; the successive approaches of the stamens of Parnassia palustris to the pistil; the movements of the leaves of the Moving Plant of India; and those caused by agitation or by the touch of a foreign body in the leaves of sensitive plants of the Dionœa or Venus's Fly-trap, etc., in the stamens of the Barberry, Shizanthus, etc., and in the stigmas of Mimulus, etc. Many explanations have been proposed of these phenomena, but none satisfactory. Of the existence of anything analogous to the nervous system of animals, which has been imagined, there is not the slightest proof.

IRTISH, ir'tish, or **IRTYSH,** a river of Asia, which rises in China, in the Altai Mountains, and after expanding into Lake Zaisan, flows through the Russian territory of Semipalatinsk, then through part of West Siberia, passes the town of Tobolsk, and finally, after a course of about 2,000 miles, joins the Ob near Samarova. It is navigable for a great part of its length and is ice-free for about one-half of the year. Its principal affluents are, on the right: Bukhtarma, Om and Tara; on the left: Ishim, Konda and Tobol. The principal ports are Semipalabinsk, Omsk, Tara and Tobolsk.

IRTYSH. See IRTISH.

IRUN, Spain, town on the frontier, in the province of Guipúzcoa, on the Bidassoa, and on the Spanish Northern Railway, about five miles inland from the Bay of Biscay. It is a port of entry and has the largest custom house in Spain for overland trade. It is served by several small mining railways and tramways which join it with the mines of Guipúzcoa and Navarre. It has also several medicinal springs and is a great clearing point for travelers. Its industrial establishments are numerous and thriving; they include iron foundries, tanneries, paper mills and potteries, brickyards, etc. Its most noteworthy buildings are the town hall and a parish church in the Renaissance style. Pop. 10,629.

IRUS, nickname of the beggar of Ithaca who served the suitors of Penelope as a messenger. His real name was Arnaeus. He was slain by Odysseus. Immortalized in the 18th book of Homer's 'Odyssey,' he becomes the typical beggar of later literature.

IRVINE, ėr'vĭn, **Frank,** American lawyer: b. Sharon, Pa., 15 Sept. 1858. After studying at Cornell University and at the National University at Washington he was admitted to the bar in 1883. For about one year he was assistant United States attorney. In 1884 he removed to Omaha, Neb., where he practised law and was appointed judge of the 4th district of Nebraska (1891–93) and Supreme Court commissioner (1893–99). In 1901 he became professor of pleading and practice in the Law College at Cornell, and dean of that faculty (1907–14). Since 1914 he has been a member of the Public Service Commission of the second district of New York.

IRVINE, William, American Revolutionary general: b. near Enniskillen, Ireland, 3 Nov. 1741; d. Philadelphia, 29 July 1804. Having graduated at Dublin University, he studied medicine and surgery, and was appointed surgeon on board a ship of war, serving during a part of the war of (1756–63) between Great Britain and France. On the declaration of peace he emigrated to America, and in 1764 settled in Carlisle, Pa. At the opening of the Revolution he took the part of the colonies, was a member of the provincial convention assembled in Philadelphia, 15 July 1774, until he was appointed by Congress, 9 Jan. 1776, colonel of the 6th battalion of the Pennsylvania line. He was sent with his command to Canada and in June 1776, was captured as the result of the disastrous engagement near Three Rivers. Exchanged 21 April 1778, he was promoted on 12 May 1779 to the rank of brigadier-general, and assigned to the command of the second brigade of the Pennsylvania line. In the autumn of 1781 he was ordered to Fort Pitt, to take command of the troops on the western frontier, and continued to fulfil the duties of this post, until after the war had closed. He was early in 1785 appointed by the State agent under an "act for directing the mode of distributing the donation lands promised to the troops of the commonwealth." About this time he suggested to Pennsylvania the purchase from the United States of the tract of land known as "the triangle," thus giving to the State an outlet upon Lake Erie. He was a member of Congress under the confederation (1787–88) and of the Third Federal Congress (1793–95). In 1794 he was assigned to the command of the Pennsylvania troops for the purpose of quelling the "whisky insurrection," and in all the most important movements in connection with this subject took an active part. In 1797 he was one of the 13 presidential electors from Pennsylvania who elected John Adams President of the United States. In 1801, after Thomas Jefferson's election to the presidency, he was appointed intendant of military stores, having charge of arsenals, ordnance, army supplies and Indian affairs. He was president of the State society of the Cincinnati at the time of his death. Consult Butterfield, C. W., ed., 'Washington-Irvine Correspondence' (Madison 1881); Montgomery, T. L., ed., 'Pennsylvania Archives' (Series V, Vol. II, Harrisburg 1906).

IRVINE, er'vin, Scotland, royal, municipal, police burgh and seaport of Ayrshire, on the Irvine estuary, and on the Caledonian Railway, 30 miles southwest of Glasgow. Its public buildings include the town hall, academy, and fever hospital. It has also two old Norman castles. The chief industries are iron founding, shipbuilding, manufacture of machinery, soap, chemicals, bookcloth, etc. Coal, iron, and chemical products are exported. The harbor had become silted up by 1875, but has since been dredged and new wharves have been installed, and the volume of its sea trade has greatly increased. The water-supply system is the property of the burgh. Pop. 10,180.

IRVING, ėr'vĭng, **Edward,** Scottish preacher, founder of the religious sect known as Irvingites: b. Annan, Dumfriesshire, 4 Aug. 1792; d. Glasgow, December 1834. He was graduated at the University of Edinburgh in 1809, taught school for some eight years, meanwhile becoming, 1815, a licentiate of the Church of Scotland and, in 1819, Dr. Chalmer's assistant in Saint John's parish, Glasgow. During these years he formed an intimate friendship with Carlyle whom he introduced to his future wife, Jane Welsh. Irving himself had been in love with the latter, but, having become engaged some years before to a Miss Martin, finally married this lady. In 1822 he became minister of the Caledonian Asylum chapel in Cross Street, Hatton Garden, London. Here he soon attracted very large congregations by the force and eloquence of his discourses, and the singularity of his appearance and gesticulation. The greatest orators and statesmen of the day crowded with the wealthy and fashionable to hear him. The appearance of the preacher — tall, athletic, and sallow — displaying a profusion of jet-black glossy hair reaching to his shoulders, with a singuar obliquity in one of his eyes, and a stern calm solemnity of aspect, enhanced the interest and excitement produced by his discourses. His phraseology was one of the peculiarities which gave him *éclat* with the public, for he expressed his ideas in the language of Milton, Hooker, and Jeremy Taylor. At London he began to publish books in which he broached novel theological views. 'Sermons, Lectures, and Occasional Discourses,' in which his theological divergences were first distinctly enunciated, were published in 1828. In the beginning of 1832 his inferences, especially in connection with the so-called "unknown tongues," miraculous powers supposed to be owned by a Scotch girl, Mary Campbell, had appeared so extraordinary to his hearers, who in 1829 had erected for him a large church in Regent Square, that they preferred charges against their minister. On 2 May 1832 the London presbytery unanimously found him guilty of error. The consequence was that he was dismissed from his pulpit. In 1833 the presbytery of Annan, which had licensed him, deposed him from the ministry, on which occasion his defense of himself was a sublime effort of oratory. He retired to Scotland, broken in health and spirits, and was attacked with consumption. He also published 'Four Orations' (1823); 'For Judgment to Come' (1823); 'Babylon and Infidelity Foredoomed' (1826); 'Exposition of the Book of Revelation' (1831). A collection of his writings, edited by Gavin Carlyle, was published in 5 volumes

(1864-65). (See CATHOLIC APOSTOLIC CHURCH). Consult Anon., 'E. Irving and the Catholic Apostolic Church' (London 1856); Oliphant, Mrs., 'Life of E. Irving' (2 vols., London 1862); Wilks, W., 'E. Irving' (London 1854).

IRVING, SIR Henry (originally JOHN HENRY BRODRIBB), English actor: b. near Glastonbury, 6 Feb. 1838; d. Bradford, 13 Oct. 1905. He was a clerk in London, but adopted the theatrical profession, his first appearance being at Sunderland in 1856. He appeared first in London at the Princess' Theatre, in 1859; later went to Manchester and other provincial towns where he remained for five or six years, but returned to London in 1866, where his first marked success was as Digby Grant in Albery's 'Two Roses' (in 1870), which was followed by his powerful impersonation of Mathias in 'The Bells.' This began, in 1871, his long association with the Lyceum Theatre. His next noteworthy parts were Charles I, Eugene Aram, and Richelieu, in the plays so named. In 1874, at the Lyceum Theatre, he sustained the part of Hamlet so successfully as to raise himself to the first place among English actors. His chief Shakespearian parts were Macbeth, Othello, Shylock, and Richard III. In 1878 he leased the Lyceum Theatre for himself, and later put on the stage in excellent style 'Othello,' 'The Merchant of Venice,' 'Much Ado About Nothing,' 'Romeo and Juliet,' 'Twelfth Night,' 'Faust,' 'Macbeth,' 'Henry VIII,' 'King Lear,' etc., playing in them the principal character with Miss Ellen Terry as his leading lady. His appearances in the provinces were equally successful with those in London, and he met with like favor in his repeated visits to the United States. Of his last great rôles may be cited Becket in Tennyson's play of that name (1893), King Arthur in a play of that name (1895), Napoleon in 'Madame Sans-Gene' (1897), the title rôle in his son's play of 'Peter the Great' (1898), and Robespierre in a play of that name (1899), especially written for him by M. Victorien Sardou, and the title rôle in 'Dante' by the same author (1903). He was knighted in 1895, being the first actor to receive this honor, and the universities of Dublin, Glasgow and Cambridge conferred on him the honorary degree of LL.D. Although critics by no means agreed as to the merits of his acting, it must be admitted that he excelled in originality, versatility and intellectuality of his interpretations practically every actor of his times. His mannerisms of expression and deportment frequently lowered the value of his work, the sincerity of which, however, could not be decreased even by these handicaps. As a manager, too, he was a leading figure, both in respect to his elaborate productions and to the quality of his supporting companies. He was buried in Westminster Abbey. Some of his public addresses have been published, notably 'The Stage' (London 1878); 'The Stage as It Is' (London 1881); 'English Actors' (Oxford 1886); 'The Drama' (London 1893). Consult Archer, W., 'Henry Irving, Actor and Manager' (London 1883); Brereton, A., 'The Lyceum and Henry Irving' (London 1903); Id., 'Life of Henry Irving' (2 vols., London 1908); Child, H. H., 'Sir Henry Irving' (in 'Dictionary of National Biography,' 2d Supplement, Vol. II, London 1912); Drew, E., 'Henry Irving on and off the Stage' (London 1889); Fitzgerald, P., 'Sir Henry Irving' (London 1906); Forshaw, C. F., ed., 'Tributes to the Memory of the late Sir Henry Irving' (London 1905); Hiatt, C., 'Henry Irving' (London 1899); Marshall, F., 'Henry Irving, Actor and Manager' (London 1883); Menpes, M., 'Henry Irving' (London 1906): St. John, C., 'Henry Irving' (London 1906); Shaw, G. B., 'Dramatic Opinions and Essays' (London 1907); Stoker, Bram, 'Personal Reminiscences of Henry Irving (2 vols., London 1906); Terry, Ellen, 'The Story of My Life' (London 1908); Winter, W., 'Henry Irving' (New York 1855).

IRVING, Henry Brodribb, English actor-manager, son of Sir Henry Irving: b London, 5 Aug. 1870. He was educated at Marlborough College and at New College, Oxford. He appeared first on the stage at the Garrick Theatre in 'School,' 1891; was called to the bar in 1894, but within a short time gave up the law for the stage. In 1895 he played at the Comedy with Comyns Carr and later in the same year toured the provinces with Ben Greet. The following year he appeared at the Saint James's. Since 1900 he has become one of the most successful London managers. In 1908 he became the lessee of the Shaftesbury Theatre and in 1909-11 was lessee of the Queen's. He toured America in 1906, Australia in 1911-12 and South Africa in 1912-13. Since the latter year he has been lessee of the Savoy Theatre. He has published 'The Life of Judge Jeffreys' (1898); 'French Criminals of the 19th Century' (1901); 'Occasional Papers' (1906); 'The Trial of Franz Müller' (1911); 'The Trial of Mrs. Maybrick' (1913).

IRVING, Isabel, American actress: b. Bridgeport, Conn., 28 Feb. 1871. In January 1887 she made her debut as Gwendolyn Hawkins in 'The Schoolmistress' with the Rosina Vokes Company. From 1888 to 1894 she was a member of Augustin Daly's company. Subsequently she was leading woman at the Lyceum Theatre, New York, and in John Drew's company for several years. Miss Irving has played leading rôles in England also; created the rôle of Lady Jocelyn Leigh in 'To Have and to Hold.' She starred under the management of James K. Hackett in 'The Crisis.' She played Louise in the all-star cast of 'The Two Orphans,' in 1905, under the management of Liebler and Company. She was engaged by Fitch to play in 'The Toast of the Town,' in 1906; in 'Susan in Search of a Husband,' and 'The Girl who Has Everything,' in 1907. In the following year Miss Irving created the title rôle in 'Mater' at the Savoy Theatre, New York. She played the leading woman's rôle in 'The Flag Lieutenant'; and leading rôle in 'The Commanding Officer' (1909). She also played the comedy rôle in 'Smith' with John Drew at the Empire Theatre, New York, and on tour in 1909-11. In 1913 she had the title rôle in the 'Mollusc,' with Kyrle Bellew, and later in the same year was leading woman with Leo Dietrichstein in 'The Concert' and 'The Tempermental Journey.' In 1914-15 she played the comedy rôle in 'Under Cover' in Chicago and San Francisco and in 1916-17 co-starred with Tom Wise and Constance Collier in 'The Merry Wives of Windsor.' In the latter year

she played 'Mistress Page' at the Park Theatre, New York. Consult Strang, L. C., 'Famous Actresses of the Day in America' (New York 1900).

IRVING, John Duer, American geologist: b. Madison, Wis., 18 Aug. 1874. He was graduated at Columbia University in 1896. He was geologic aid in 1899–1900; assistant geologist, in 1900–06; and geologist in 1906–07 of the United States Geological Survey. At the University of Wyoming in 1902–03, while on a special leave of absence he was acting professor of mining and geology and in 1906 was professor of geology at Lehigh University. Since 1907 he has been professor of economic geology at the Sheffield Scientific School of Yale. In 1907 he was employed as geologist by an Alaska syndicate. He is editor of *Economic Geology* and author of 'Economic Resources of the Northern Black Hills.'

IRVING, Lawrence (SYDNEY BRODRIBB), English actor, son of Sir Henry Irving: b. 1872; d. 31 May 1914. He received his education in Marlborough College, the Collège Rollin, Paris. He was intended for the diplomatic service and for three years studied in Russia. His theatrical debut took place at Dundee in 1893 in a Shakespeare rôle. From that time to 1900 he starred in provincial companies appearing in such plays as 'Trilby,' 'A Bunch of Violets,' and 'Under the Red Robe.' From 1900 to 1904 he was a member of his father's company. Soon after he appeared as Crawshay in 'Raffles.' In 1908–09 he visited America where he appeared in his own plays. In 1910 he produced 'The Unwritten Law' at the London Garrick. In 1912 he again appeared in a Shakespearean rôle — Iago in Tree's company at His Majesty's Theatre, Montreal. He lost his life on the *Empress of Ireland,* when that vessel was rammed and sunk by a collier in the Saint Lawrence. Irving wrote 'Peter the Great,' 'Bonnie Dundee,' 'Richard Lovelace,' 'The Typhoon,' and a translation of Gorky 'The Lower Depths' (1912).

IRVING, Washington, American author: b. New York, 3 April 1783; d. Tarrytown, N. Y., 28 Nov. 1859. His father, William Irving, merchant, came to New York from the Orkneys in 1763, having married Sarah Sanders, daughter of Cornish parents, two years before. Washington was the youngest of their 11 children. His school training was far from thorough, and was not directed toward academic culture — though two of his brothers had been sent to Columbia College — a decision of his father that he much regretted in maturer years. He made up for his lack of interest in school subjects by enthusiastic reading in English authors, particularly Chaucer and Spenser. At 16 he entered a law office, and in 1802 began authorship by contributing humorous sketches, over the name of "Jonathan Oldstyle," to *The Morning Chronicle,* a daily edited by his brother Peter. Developing symptoms of consumption, he sailed in 1804 for France, and spent two years in travel, on the continent and in England, which restored his health. On return he was admitted to the bar, but instead of practice began, in 1807, with his brother William and James K. Paulding, the issue of 'Salmagundi,' the success of which determined his career, and the immediate character of his writing. At the close of the next year he set about reshaping the burlesque history of New York, which he had begun, with Peter Irving, some time before on a different plan. While in this work he met with the great affliction of his life, the loss of his betrothed, Matilda Hoffman, daughter of a prominent lawyer of the city, in whose office he had finished his legal studies. The completion of the book, 'Dietrich Knickerbocker's History of New York,' published in 1809, was the only solace that he permitted himself in the first months of seclusion and grief. In 1810 he wrote a short life of the poet Campbell, and was received into partnership by his brothers Peter and Ebenezer, who were founding an importing house, and wished to provide Washington the means, without contribution of time or labor to the business, of preparing himself more fully for his chosen work. In 1813 and 1814 he edited the *Analectic Magazine,* published in Philadelphia, and contributed biographical articles upon some of the naval commanders in the war then in progress with Great Britain. After the burning of our national capital in 1814 he offered his services to his native State, and was made aide-de-camp to Governor Tompkins, with the rank of colonel. At the close of the war he sailed for England, and was received with distinction by the American artists Allston and Leslie, and by Scott, Campbell, Moore and other literary men. In 1818 the firm of P and E. Irving and Co. failed, and Washington's pleasant rambles in England and Scotland came to an end. He declined a post in the navy board, at home, and set himself at work in London with his pen. Early in the next year he sent over for publication in New York and Philadelphia the first number of the 'Sketch Book,' containing 'The Voyage,' 'Roscoe,' 'The Wife' and 'Rip Van Winkle.' Other numbers followed, the success was great, and in 1820 John Murray brought out an edition of the work in London. Its popularity with British readers was such that Murray became the first publisher of 'Bracebridge Hall' (1822), 'Tales of a Traveller' (1824), and other works. In 1826 Irving went to Madrid at the instance of his friend, Alexander H. Everett, American minister to Spain, who advised the translation of Naverreté's 'Voyages of Columbus,' then issuing in parts. Irving found the work impracticable to translate, being a collection of sources rather than a consistent narrative, and prepared instead the 'History of the Life and Voyages of Christopher Columbus,' finished in 1828. This first serious product of Irving's powers retained much of the ease and charm of 'The Sketch Book' and 'Tales of a Traveller,' and was eminently adapted to increase his fame. It was not especially successful, though Murray paid 3,000 guineas for the copyright; an abridgment of the work had a better sale. 'The Conquest of Granada' (1829), 'Companions of Columbus' (1831) and 'The Alhambra' (1832) were further fruits of his Spanish studies and travel. In the meantime he had been made secretary of legation (1829) in London, and received the medal of the Royal Society of Literature (1830), and the degree of LL.D. (1831) from Oxford. In 1832 he returned to America, but not to rest. He accompanied an Indian commission to Fort Gibson, on the Arkansas River, and wrote 'Tour on the Prairies,' published as

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the first volume of 'Crayon Miscellanies,' in 1835. The second volume, 'Abbotsford and Newstead Abbey,' and the third, 'Legends of the Conquest of Spain,' followed in a few months. He now bought the little Van Tassel farm at Tarrytown, and began to enlarge its Dutch cottage and improve the grounds. To this home, called "Sunnyside," he soon removed from the city, and eventually brought to it the brothers who had aided him in earlier years. In 1836 he finished 'Astoria,' with the help of his nephew, Pierre M. Irving, from materials furnished by John Jacob Astor. The next year he published 'The Adventures of Captain Bonneville,' properly a continuation of the preceding. He then began a history of the conquest of Mexico, but on learning that W. H. Prescott was at work on the same subject resigned the task to him. In 1839 he engaged to write for the *Knickerbocker Magazine,* and furnished monthly articles for about two years. In 1842 he was appointed Minister to Spain, and for the next four years wrote little. On return he arranged with G. P. Putnam for a complete edition of his works, in 15 volumes, to which he added (1849) the 'Life of Goldsmith,' and (1850) 'Mahomet and his Successors.' The way was now open for the 'Life of Washington,' which had long been contemplated. In 1855 appeared 'Wolfert's Roost,' mainly a reprint of the Knickerbocker papers, and two volumes of the 'Life.' The work told on his strength, and the fifth and last volume, finished in March 1859, left him a broken man. His death was from heart disease, in his 77th year. He was buried by the side of his mother, whose tastes he had inherited and whose sympathy and nurture had made him what he was. His authorship was the outcome of his personal character, and was little modified by the literatures of the world. With all his graces of expression he lacked the gift of deep insight, and failed to achieve much vigor of style. The best biography is still the 'Life and Letters' by his nephew, Pierre M. Irving (1863). (See SKETCH BOOK, THE; KNICKERBOCKER HISTORY OF NEW YORK). Consult also Warner, 'Washington Irving' (1881); Laun, 'Washington Irving: Ein Lebens- und Charakterbild' (1870); Richardson, 'American Literature' (1887–88); Wendell, 'A Literary History of America' (1900); Boynton, H. W., 'Washington Irving' (New York 1911).

L. A. SHERMAN,
The University of Nebraska.

IRVINGITES. See CATHOLIC APOSTOLIC CHURCH.

IRVINGTON, N. J., a town in Essex County, adjoining Newark on the southwest. It is a pleasant residential suburb of that city, and has a number of manufactories, smelting-works and establishments for making wall-paper, pocket-book frames, linoleum, tools, brushes, rules, etc. The town was incorporated in 1898, although its settlement as Camptown dates back almost to 1660. Its governmental affairs are in the hands of a commission. Pop. 20,342.

IRVINGTON, N. Y., village in Westchester County, on the Hudson River, and the New York Central and Hudson River Railroad, 23 miles north of New York and a short distance south of Tarrytown; named in honor of Washington Irving. It is mainly a residential village of recent growth and is noted for its beautiful dwellings and grounds, with fine situation on the river-bank. These are largely the homes of New York business men and their families. The Guiteau Library and the town hall are among its most noteworthy buildings. The village is a place of great interest as being the location of "Sunnyside," for many years the home of Washington Irving. The house, half a mile north of the railroad station, "is a many-gabled, vine-clad cottage, covered with stucco, and shadowed by grand trees." It has been rebuilt and enlarged. Pop. 2,379.

IRWIN, May, American actress: b. Whitby, Ont., Canada, 1862. She made her debut at the Adelphi Theatre, Buffalo, 26 May 1876. Coming to New York the following year she became a member of Tony Pastor's company, remaining until 1883. For the next four years she was a member of Augustin Daly's Company. Subsequently she appeared in the 'Junior Party,' 'His Wedding Day,' 'Poets and Puppets,' 'A Straight Tip,' etc. Later she starred in 'The Widow Jones,' 'The Swell Miss Fitzwell,' 'Courted into Court,' 'Kate Kip-Buyer,' 'Sister Mary,' 'Belle of Bridgeport,' 'Mrs. Black is Back,' 'Mrs. Wilson—Andrews,' 'Mrs. Peckham's Carouse,' 'Getting a Polish,' 'She Knows Better Now,' 'A Widow by Proxy,' 'No. 33 Washington Square.' Consult Hapgood, N., 'The Stage in America' (New York 1911) and Strang, L. C., 'Famous Actresses of the Day in America' (ib. 1900).

IRWIN, Wallace, American journalist and author: b. Oneida, N. Y., 15 March 1876. In 1900 he was special writer on the San Francisco *Examiner* and in the following year edited the *News Letter* of that city. In 1903 he wrote burlesque sketches for the Republic Theatre; for the next two years he wrote topical verse in the New York *Globe,* and in 1906–07 was on the staff of *Collier's Weekly.* He has published 'The Love Sonnets of a Hoodlum' (1902); 'The Rubaiyat of Omar Khayyam, Jr.' (1902); 'Fairy Tales Up to Now' (1904); 'Nautical Lays of a Landsman' (1904); 'At the Sign of the Dollar' (1904); 'Chinatown Ballads' (1905); 'Random Rhymes and Odd Numbers' (1906); 'Letters of a Japanese Schoolboy' (1909); 'Mr. Togo, Maid of All Work' (1913); 'Pilgrims into Folly' (1917). In 1917 Mr. Irwin was appointed a member of the Committee on Public Information.

IRWIN, William Henry (WILL IRWIN), American author and journalist: b. Oneida, N. Y., 14 Sept. 1873. In 1889 he was graduated at Stanford University. Entering journalism in San Francisco, he was assistant editor of the *Wave* in 1899 and editor in 1900. In 1901 he joined the staff of the *Chronicle* as reporter and was its Sunday editor in 1902–04. From 1904 to 1906 he was a reporter on the New York *Sun,* and in 1906–07 managing editor of *McClure's Magazine.* In 1907–08 he was engaged as a writer for *Collier's,* since when he has devoted himself to general magazine writing. He served as war correspondent with German, Belgian and British armies for various American publications and for the London *Daily Mail* in 1914–15. He also was member of the executive committee of the Belgian Re-

lief Commission in 1914–15, and war correspondent of the *Saturday Evening Post* in 1916–18. In 1918 he was made chief of the foreign department of the Committee on Public Information. His publications include 'Stanford Stories,' with C. K. Field (1900); 'The Reign of Queen Isyl,' with Gelett Burgess (1903); 'The Pickaroons,' with G. Burgess (1903); 'The Hamedryads' (1904); 'The City that Was' (1907); 'Old Chinatown' (1908); 'The Confessions of a Con Man' (1909); 'Warrior the Untamed' (1909); 'The House of Mystery' (1910); 'The Readjustment' (1910); 'The Red Button' (1912); 'Where the Heart Is' (1912); 'Beating Back,' with Al. Jennings (1914); 'Men, Women and War' (1915); 'The Latin at War' (1915); 'A Reportor at Armageddon' (1918); also pamphlets, 'The Babes of Belgium' (1915), and 'The Splendid Story of Ypres' (1915).

ISAAC, Hebrew patriarch, son of Abraham and Sarah. The name in its Hebrew original denotes "laughter," because when the promise of a child was made to him the year previously, Abraham had laughed. He was 100 years old at the child's birth, and Sarah, who had been childless, was 90, and had also laughed in her incredulity, as standing at the tent's door, she had heard the angel repeat the promise (Gen. xvii 17). His initiation into the covenant when eight days old was one of the many incidents in Isaac's life which the Bible mentions and which gave him a national importance to which his nomadic pastoral life and quiet character would not perhaps entitle him. The dismissal of Hagar's son, whom Sarah had seen mocking Isaac, the offering of Isaac as a sacrifice (Gen. xxii) which was providentially averted, being only a test of faith and obedience; his marriage to Rebekah, the Aramean in his 40th year, the birth of the twins Esau and Jacob after 20 years, their opposite traits, later to develop into strife, Isaac's dream and God's promise to him of future enlargement,—are all portrayed at length in Scripture. Then comes the story of his old age, which was less happy than might have been expected from one of his temperament and qualities. Blindness added to the weakness of years, while the open enmity between his two sons increased his anxieties. How in anticipation of his own death he bade Esau bring him some venison to receive his blessing, how Jacob urged by Rebekah who had heard Isaac's request, appeared as Esau before the blind father to receive the blessing promised to his brother, how Esau learned of Jacob's action and how Jacob had to flee from Esau's wrath—are episodes that have become "twice told tales" and preserve after thousands of years their dramatic interest, while for the pulpit of all creeds they retain their power. At the age of 180 Isaac died at Hebron, cheered by the return of Jacob and his family from Mesopotamia, and was buried by both of his sons in the cave of Machpelah beside Abraham and Sarah.

The early rabbis in the Midrash make frequent reference to Isaac. His name is made a compound of two Hebrew words denoting "Law was issued." In the Hebrew letters of his name allusion is found to the ten words (decalogue), and the respective ages of Sarah and Abraham at his birth. To silence evil tongues on the occasion of Isaac's weaning, Abraham's features were imprinted on his face, so that the likeness between father and son was very great. The sacrifice of Isaac furnishes a fertile field for Midrashic reflection and becomes a special feature of the Jewish liturgy. Isaac is stated to have instituted the traditional afternoon prayer and to have had extraordinary attributes. In Mohammenden legend, Ishmael appears substituted for Isaac as offering and other points of similarity with the rabbinical Midrash are to be observed.

ISAAC I, COMNENUS, Byzantine emperor: d. 1061. He was the son of Manuel Commenus, an eminent general under Basil II, emperor of Constantinople, and was the first of his family to assume the purple. He had distinguished himself as a soldier and commander in the wars against the Arabs, in Asia Minor, and had married a captive Bulgarian princess. In 1057 he succeeded to the throne upon the deposition of the aged and incompetent Michael VI. He abdicated in 1059 on account of sickness and spent the remainder of his life in the monastery at Studion where he had received his education as a youth. During his short reign he fought successfully against the Hungarians and Petchenegs who were threatening the northern borders of the empire. He also improved the financial conditions of the country, though his measures in this direction were very unpopular. He appointed a relative, Constantine Ducas, as his successor. His interests were not purely military or political; he left a manuscript, still in existence, on Homer, entitled 'Scholia.' He also wrote two other works on the same subject 'Characteristics' and 'On the Works of Homer.' Consult Gibbon, E., 'History of the Decline and Fall of the Roman Empire' (Vol. V, London 1898); Finlay, G., 'History of the Byzantine and Greek Empires, 1057–1453' (Edinburgh 1854); Id., 'History of Greece' (Vols. II, III, IV, Oxford 1877).

ISAAC II, ANGELUS, Byzantine emperor: d. 1204. He became sovereign of the East as successor of Andronicus I in 1185, and reigned 10 years. During his rule the Bulgarians and Vlachs revolted a number of times. After promising free passage through his empire to the crusaders under Frederic I Barbarossa (q.v.) of Germany, he treacherously formed an alliance against them with Saladin (q.v.) and was compelled to keep his promises only through force of arms. Isaac was a vicious and cowardly prince, and was dethroned, blinded, and imprisoned by his brother Alexius in 1195. Eight years later he was restored to the throne and reigned for six months, when he was again dethroned, and soon after died in prison. Consult Gibbon, E., 'History of the Decline and Fall of the Roman Empire' (Vol. V, London 1898); Finlay, G., 'History of the Byzantine and Greek Empires, 1057–1453' (Edinburgh 1854); Id., 'History of Greece' (Vols. III, IV, Oxford 1877).

ISAAC OF ANTIOCH, Syrian churchman and author: b. probably at Edessa, early in the 5th century. He removed to Antioch about 450 A.D. and for very many years was abbot of a monastery near that city. Many of his works are lost, but about 190 extant metrical

homilies are attributed to him. Of these some most certainly are the work of another Isaac. (See SYRIAC LITERATURE). Consult Bedjan, 'Homiliæ S. Isaaci' (Paris 1903) and Brockelmann, 'Die Litteraturan des Ostens' (Vol. VII, Giessen 1907).

ISAACS, Rufus Daniel. See READING OF EARLEY.

ISAACS, Samuel Myer, Jewish editor: b. Leeuwarden, Holland, 4 Jan. 1804; d. New York, 19 May 1878. Coming to England in his early childhood, after work as educator in London, he was called to the ministry of the Elm Street synagogue in New York (1839). English sermons were then a novelty and his influence rapidly spread. In 1847 he was chosen minister of Wooster Street synagogue, with which he remained until his death. In the formative period of American Judaism, he was ceaseless in his activity — founding (1857) the *Jewish Messenger,* which he edited until the close of his life. His suggestions gave rise to many local and national institutions in education and charity; he was one of the founders and first vice-president of the Mount Sinai Hospital and universally esteemed for his genuine piety and usefulness.

ISAAKS, Jorge, hor'hā ē'sāks, Colombian novelist and poet b. Cali, State of Cauca, Colombia, 1843; d. 1895. He was the son of an English Jew who had married a Spanish woman and was taken to Bogotá in childhood, and ever after made it his home. He held various political offices, but is best known for his literary work. He published a volume of poems in 1864, and in 1867 his masterpiece, the novel, 'Maria,' a story of domestic life in Colombia, told with consummate skill and tender simplicity. An English translation of it was published by R. Ogden (New York 1890). He also wrote various other novels, none of which, however, achieved the fame of his first one.

ISABELA, ē-sā-bā'lā, Philippines, province of Luzon, on the northern Pacific Coast of the island with Cagayán on the north and Príncipe and Nueva Ecja on the south; length 118 miles; area, 5,395 square miles (including dependent islands), the largest province of Luzon. The Sierra Madre mountain range runs parallel to the coast, a short distance inland; the rest of the surface is broken by low hills; the Grande de Cagayán River traverses the entire length of the province; and the main highway from Aparri to Manila parallels this river. Rice, sugarcane, chocolate, coffee, corn and vegetables grow with little cultivation; tobacco is extensively raised and its growth and treatment is the most important industry. Cattle raising is also an important industry. Civil government was established in 1901. Pop. 76,431.

ISABELA, P. I., town in the province of Negros Occidental, Island of Negros, 35 miles south of Bacólod. Pop. 12,800.

ISABELLA, ISABEAU, or **ELIZABETH OF BAVARIA,** Queen of France: b. 1370; d. September 1435. In 1385 she was married to Charles VI of France, to whom she bore several children. She soon came under the influence of the dissolute court and when the king became insane in 1392 Isabella consorted with the king's brother, the Duke of Orleans. She was several times regent of the kingdom and on each occasion used her office to her own profit. After the assassination of the Duke of Orleans in 1407 she led a very scandalous life. She supported one political party after another and in 1417 was imprisoned. John the Fearless liberated her and in 1420, by the treaty of Tróyes, Isabella surrendered the kingdom of France to the English. She gave her daughter in marriage to Henry V of England. After the Treaty of Troyes, Isabella was despised and hated by the French. She lived a lonely life of poverty in Paris. Consult Thibault, 'Isabeau de Bavière' (Paris 1903).

ISABELLA (ĭz-a-bel'a) **(I) OF CASTILE,** Queen of Spain, daughter of John II, King of Castile and Leon and his second wife Isabella of Portugal: b. Madrigal, 22 April 1451; d. Medina del Campo 26 Nov. 1504. She married, 19 Oct. 1469, Ferdinand V, King of Aragon (q.v.), surnamed "The Catholic." After the death of her brother, Henry IV in 1474 she ascended the throne of Castile, to the exclusion of the latter's daughter, Joan, who was claimed to have been illegitimate. After the kingdoms of Aragon and Castile were thus once more united, Ferdinand and Isabella assumed the royal titles of Spain. She was always present at the transaction of state affairs and insisted that her name should be placed beside that of her husband in public ordinances. The conquest of Granada, after which the Moors were entirely expelled from Spain, was in a great degree her work; and the encouragement she gave Columbus, when everybody else doubted the feasibility of his plans, assisted him to the discovery of America. The broadness of her political vision and the strength of her character were chiefly responsible for the foundation of Spain's greatness. In all her undertakings Cardinal Ximenes was her assistant. In 1492 Pope Alexander VI confirmed to the royal pair the title of "Most Catholic," already conferred on them by Innocent VIII. The zeal for the Roman Catholic religion, which procured them this title, unfortunately brought about the introduction of the Inquisition, which was instituted in Spain in 1480, at the suggestion of their confessor, Torquemada. (See FERDINAND V, XIMENES, SPAIN and COLUMBUS). Consult Clemencin, D., 'Précis Historique sur la Reine Catholique Doña Isabelle' (Paris 1847); George, A., 'Annals of the Queens of Spain, etc.' (2 vols., New York 1850); Hare, C., 'Queen of Queens and the Making of Spain' (New York 1906); Howard, O. O., 'Isabella of Castile' (New York 1894); Hume, M. A. S., 'Queens of Old Spain' (New York 1906); Lea, H. C., 'The Moriscos in Spain' (Philadelphia 1901); Id., 'History of the Inquisition of Spain' (4 vols., Philadelphia 1906–07); Mariejol, J. H., 'L'Espagne sous Ferdinand et Isabella' (Paris 1892); Nervo, G. D., 'Isabella, the Catholic' (trans. by T. Temple-West, London 1897); Prescott, W. H., 'History of the Reign of Ferdinand and Isabella, the Catholic' (3 vols., Philadelphia 1873); Sela, G., 'Politica Internacional de los Reyes Catolicos' (Madrid 1905).

ISABELLA II, ex-queen of Spain, daughter of Ferdinand VII and his fourth wife, Maria Christina of Naples: b. Madrid, 10 Oct. 1830; d. Paris, France, 9 April 1904. She suc-

ceeded her father in 1833, her mother, Queen Christine, acting as regent. The early years of her reign were disturbed by a rising in favor of her uncle, Don Carlos, who, if the Salic law had not been set aside, would have ascended the throne instead of her; but this was quelled in 1839. She was declared of age in 1843 and in 1846 was married to her cousin, Don Francisco d'Assisi (q.v.). She possessed few of the qualities that might have made her a successful ruler. She was bigoted, pleasure-loving, easily influenced and without political acumen. Her reign was so erratic and despotic that it resulted in many revolutions, the last of which, in 1868, finally drove her from the country. From then on she lived most of the time in or near Paris. She resigned her claims to the Crown in favor of her son Alfonso, who ascended the throne in 1875 as Alfonso XII (q.v.). Consult Abbott, J. S. C., 'Kings and Queens, Etc.' (New York 1848); Cambronero, C., 'Las Cortes de Isabel II' (in *España Moderna*, Vols. XXII–XXIII, Madrid 1910–11); Gribble, F. H., 'The Tragedy of Isabella II' (London 1913); Jarnar, A., ed., 'Les Rois Contemporains' (Bruxelles 1849); Molloy, J. F., 'The Romance of Royalty' (2 vols., New York 1904); Zöpfe, H., 'Historical Essay Upon the Spanish Succession' (London 1840). See SPAIN.

ISABELLA. 'Isabella, or the Pot of Basil,' written by John Keats in 1818 and published in the same volume with 'Lamia' and 'The Eve of Saint Agnes' in 1820, is a romantic tale in verse, founded on the fourth novel of the fifth day in Boccaccio's 'Decameron.' It tells of the love of the Florentine maiden Isabella for Lorenzo, a humble servitor in the establishment of her cruel and haughty brothers. Discovering her passion they treacherously murder her lover and bury his body in a forest. Lorenzo's spirit appears before the languishing Isabella and tells the story of his death. She, in her passion, digs up the body of the slain, cuts off the head and buries it in a garden pot, watering the basil plant which grows above it with her tears and dying of grief when it is stolen by her brothers. The revolting details of the story are not avoided by the author, but they are rendered tolerable by the rich poetic beauty with which they are invested. Love, which outlives death and can thrive on the "wormy circumstance" of dissolution, is the essential theme of the poem. The characteristic atmosphere of languishing beauty and decay is well rendered in Alexander's familiar painting, "Isabella." The poem represents a considerable advance in art over Keats's earlier 'Endymion'; it is nevertheless inferior to his more mature and exquisite treatment of the theme of romantic love in 'The Eve of Saint Agnes.' For references consult article 'Ode on a Grecian Urn.'

JAMES H. HANFORD.

ISABELLITA. See BUTTERFLY-FISH.

ISABEY, e-za-ba', **Jean Baptiste**, French portrait painter: b. Nancy, 11 April 1767; d. 18 April 1855. He studied painting with David with the intention of applying himself to historical work, but began his art career with crayon portraits and achieved a wide renown as a miniature painter. His painting of Napoleon I reviewing his troops in the court of the Tuileries won the friendship of the Emperor and the appointment of court painter. The chief personages of Europe sat to him. His 'Napoleon at Malmaison' is considered the best portrait of that ruler. Besides a large number of portraits, he painted two notable historical and portrait-group works — the 'Tableau des Marechaux' (Napoleon and his principal generals), and the 'Conference at Vienna' after Napoleon's abdication. Consult Basili-Callemaki, 'J. B. Isabey' (Paris 1909).

ISABEY, Louis Gabriel Eugène, French painter: b. Paris, 1803; d. 1886. He received his artistic training from his father, Jean Baptiste Isabey, and in 1830 accompanied the Algerian expedition as painter. He exhibited regularly at the Salon until 1878. He excelled as a marine artist. His best known works are 'The Harbor of Honfleur' (1827); 'Battle of the Texel' (1839); 'View of Boulogne Harbor' (1843; not at Toulouse); 'Ceremony in the Church of Delft' (1847); 'Marriage of Henry IV' (1848); 'Embarkation of De Ruyter and De Witt' (1850); 'The Roadstead of Saint-Malo,' in the Luxembourg collection; 'The Banquet Hall,' in the Metropolitan Museum, New York.

ISAEUS: b. about 420 B.C.; d. about 350 B.C. one of the "Ten Attic Orators," though probably a native of Chalcis, made his home in Athens, and there, in the first half of the 4th century B.C., we find him actively engaged in the profession of a speech-writer (logographer) for clients in the law courts. It is believed that he was a pupil of Isocrates (q.v.). In Attic oratory he represents the transitory period between Lysias (q.v.) and Demosthenes (q.v.). He seems also to have taught rhetoric, to Demosthenes among others, according to one tradition. We have from him a dozen orations dealing with inheritance cases, two of them in a fragmentary condition, although it is known that he wrote at least fifty. They are valuable not only as specimens of Attic Forensic style, but also as sources regarding early testamentary and private law and regarding the social life of ancient Greece. There are quite a number of manuscripts of his speeches, the best of which is known as 'Crippsianus A' in the British Museum. Of the many editions of his speeches the following should be mentioned: Aldus (Venice 1513); Bekker, I., (Oxford 1823); Dobson, W. S., (London 1828); Baiter, J. G., and Sauppe, H., (Zürich 1838–43); Schömann, G. F. (with commentary, Greifswalde 1831); Scheibe, C., (Leipzig 1860); Bürmann, H., (Berlin 1883); May, A., (Leipzig 1892); Wyse, W. (Cambridge 1904). The best edition is that of H. Buermann (Berlin 1883). There is an English translation by W. Jones, (London 1779); 'The Speeches of Isaeus'; a German translation by G. F. Schömann, 'Isäus der Redner' (2 vols., Stuttgart 1830); and a French translation by R. Dareste, 'Les Plaidoyers d'Isée (Paris 1898). Consult Baden, W. W., 'The Principal Figures of Language and Figures of Thought in Isaeus, Etc.' (Baltimore 1906); Belin de Balu, J. N., 'Histoire Critique de l'Éloquence chez les Grecs' (2 vols., Paris 1813); Blass, F., 'Attische Beredsamkeit' (2 vols., Leipzig 1887–93); Christ, W. von, 'Geschichte der Griechischen

Litteratur' (5th ed., 3 vols., Munich 1908–13); Hitzig, H., 'Studien zu Isaeus, Etc.' (Bern 1883); Jebb, R. C., 'Attic Orators from Antiphon to Isaeus' (2 vols., London 1876); Johnson, A. C., 'A Comparative Study in Selected Chapters in the Syntax of Isaeus, Isocrates, Etc.' (Athens 1911); Moy, L., 'Étude sur les Plaidoyers d'Isée' (Paris 1876); Roeder, W., 'Beiträge zur Erklärung und Kritik des Isaios' (Jena 1880); Volkmann, R., 'Rhetorik der Griechen und Römer' (Berlin 1872).

ISAIAH, ī-zā'yą or ī-zā'yą, one of the great Hebrew prophets. The name Isaiah, more exactly *Yᵉ shă'ya* and *Yᵉ shă'yāhû*, is derived from two Hebrew words and means "Jehovah saves." It refers to the general burden of the prophet's message. The prophet, who was the son of Amoz (q.v.), a man otherwise unknown to us, was born probably at Jerusalem, and this place, the scene of his life work, and in his thought synonymous with his country, engrosses his attention. The year of his birth must have been about 760 B.C., his known activity begins in 739 and continues to 701 B.C., at least. He was married not far from the time of his call in 739, for in 735 a son of his, with a name symbolic of his prophetic message to Judah, *Shear-yashubh*, "a remnant shall turn" (i.e., to Jehovah), was of an age suitable to accompany his father in his walks. Another son, *Maher-shalal-hash-baz*, was born in 734, and his name also is symbolic of predicted events in the national history, namely, the fall of Damascus and Samaria, and means "hastening to booty, speeding to prey."

It is to be remembered that Amos (750 B.C.), and Hosea (q.v.) (735 B.C.), are the only canonical prophets that preceded Isaiah and these had their work in the northern kingdom, though Micah (q.v.) prophesied in a country district of Judah during the middle and later periods of Isaiah's ministry. It is next to certain that Isaiah was of high rank, if not of the nobility in Judah, and at times might be as bold as he chose in his utterances to the court. We cannot be certain whether the Jewish traditions that he was the nephew of King Amaziah (Megilla, 10b), that he was slain by Manasseh (Jebamoth, 49b), and that he was sawn asunder ('The Ascension of Isaiah,' Ethiopic version; cf Justin Martyr, 'Dial. c. Trypho,' chap. cxx), have a basis in fact or not.

The principal crises of the country in Isaiah's time occurred in 735, 734 (during the reign of Ahaz), and in 701 (during Hezekiah's reign). The occasion of the first was the union of Damascus and north Israel against the Assyrian over-lord, Tiglath-pileser III (745–727) and their attempt to overcome Judah. The occasion of the second crisis was the attempt of Judah and her neighbors to avoid tribute to Assyria and their alliance with Egypt against her. At this time Sennacherib was on the throne of Assyria (705–681). Besides these, there were moderate political disturbances in Judah during the reigns of Shalmanassar IV (727–722), and Sargon (722–705), for both of these warlike kings in these times were in the west country for conquest and subjugated north Israel, as well as the Philistine territory.

In meeting these crises, Isaiah showed himself the most consummate statesman and the most brilliant theological teacher in Israel in the times before Christ. His hold of truth was strong, his presentation of it was uncompromising, his oratory was superb, and the variety and finish of his discourses and the aptness of his illustrations, as well as the measured flow of his thought, were inimitable. It is of course true that in his teaching he built upon his predecessors, Amos and Hosea, but he put such a stamp of genius upon the ideas he cherished, that his influence has been the greatest of all the Hebrew prophets.

In general it may be said that Isaiah's messages had to do with the safety of the capital in the warlike times in which he lived, with the character of God in his sublime holiness and righteousness, and with the duty of his fellow-citizens to cultivate the righteous life, and, forsaking human political wisdom and alliances with the nations, to depend absolutely upon the Lord God. With him, religion and politics go hand in hand, and theological thinking is the kernel of his most practical and stirring addresses. Incidentally he has given us a view of the circumstances of his time, its social relations and habits, the fashions, the commotions and rumors, in times of peace and war, in seasons of prosperity and distress; in all showing himself the most vivid and powerful preacher of the olden time.

The convictions of Isaiah are due to his faith in God and arise out of the circumstances of the time. Jehovah is the Holy One of Israel, hence he must punish Jerusalem for her injustice to men and her falseness to God, and this he will do through the instrumentality of the most potent political powers of the age; but since Jerusalem is the throne of His glory, and the seat of true religion, however formal the people have made their worship, therefore, a portion of the Judeans will be spared, and the city will prove invincible. Indeed, his own beloved capital is destined to become the centre of religious truth for the nations, and is to have a new and perfect ruler, who will reign in wisdom and might, and will bring righteousness and peace to the people. See ISAIAH, BOOK OF.

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ISAIAH, Book of. It must be premised that the old prophets of Israel, for the most part, gave themselves to oral utterance, and made little use of the written roll. In the case of some of them, the issue of written discourses was an after-thought, and the latter assumed forms revised to suit the practical needs of the readers, just as the first forms had been adapted to the needs of the audience that listened to the preacher's spoken words. This is undoubtedly true of the phophet Isaiah, who appears to have felt that by changes in phraseology he could the better meet the advancing needs of the men for whom he labored. In other words, the prophet's interest was not historical; he did not reproduce his sermons with the thought of preserving them for the world exactly as they were delivered, but he had the practical aim of moving a new circle of people to that faith in God which he had previously inculcated. This example was not lost upon the disciples and admirers of the prophets, and in the book of Isaiah the old messages have received modifica-

tions at different times to suit the conditions of successive generations. Indeed Isaiah in the pre-Christian centuries was held in such honor that authors added to his writings other discourses and historical material that were calculated to produce the results aimed at by our prophet, and in much of this material there is not even a kernel of Isaian authorship. It is true that such procedure is not in accord with modern ideas of literary ownership, but there is reason to suppose that in ancient times the name of the author of new material was of little consequence, and his work was often hidden in the product of some distinguished predecessor, the delivery of an exigent message being all important.

The book of Isaiah contains 66 chapters from various sources, being a combination of several collections of oracles, and divides itself naturally into seven grand divisions, viz.: chapters i–xii, xiii–xxvii, xxviii–xxxiii, xxxiv–xxxv, xxxvi–xxxix, xl–lv, lvi–lxvi.

1. Chapters i–xii contain several small sections or series of addresses, mostly by Isaiah himself. From the time of his call to the prophetic office in 739 B.C., he probably made notes of his discourses, and about 734, perhaps, he began to issue combinations of these, first for his disciples, and then doubtless for a larger circle of readers. Chapters vii, 1–ix, 7, composed of discourses delivered to Ahaz and the people of Judah in 735, 734, is probably the first of these combinations, and not long afterward this was increased by prefixing to it the inaugural vision, chap. vi, and by affixing ix, 8–x, 4 (with v, 25–30, now misplaced), the prophetic interpretation of north Israel's unhappy history and the application to Judah. Subsequently the prophet appears to have added the woe on Assyria, the instrument of Jehovah's anger against his people (x, 5–34), and a prophecy of the righteous king, to whom he had already referred, and of the restoration of Israel (chap. xi).

He, or some disciple of his, prefixed to the book ii, 1–iv, 1; chap. i; v, 1–24, series of discourses that present in most vivid manner the social conditions and the debased life of the age of Jotham and Ahaz, as well as the evil consequences to follow, ere the kingdom of God could be established. Chap. i, called by Ewald "The Great Arraignment, is a general introduction to this part, and was composed after 734, possibly several years afterward, chap. i:1, being an editorial note to introduce all the prophecies of Isaiah. Chap. iv, 2–6, chap. xii, are probably post-exilic additions to this division of Isaiah.

2. Chapters xiii–xxvii may be called the book of woes. The genuine Isaiah passages are in substance: xiv, 24–27, the removal of the Assyrian yoke, xiv, 28–32 woe on the Philistines, both delivered during the domination of Sargon or Sennacherib; xvi, 13–14, on Moab, delivered perhaps in 711; xvii, 1–11, the fall of Damascus, 735; xvii, 12–14, the repulse of Assyria, 701; chap. xviii, the message to Ethiopia concerning the disaster to Assyria, 701; chap. xx, on Egypt, 711; xxi, 11, 12, on Edom, and xxi, 13–17, on Arabia, of uncertain date, may have been readapted to the exilic situation in 545 B.C.; chap. xxii, against Jerusalem and one of its prominent statesmen, belongs to 702, 701; the substance of chap. xxiii (on Tyre), especially vss. 1–14, was given about 702 B.C. Upon these as a nucleus have been grafted oracles from various epochs and authors; namely xiii, 1–xiv, 23, the fall of Babylon, composed in Babylonia about 549 B.C.; xv, 1–xvi, 12, an old oracle quoted by Isaiah himself, possibly in 711; chap. xix, on Egypt, is a post-exilic oracle, but in vss. 1–15 there may be an Isaiah kernel, from 720, 711 or 702; xxi, 1–10, on Babylon, is exilic, dating from about 545 B.C.; chapters xxiv–xxvii form a long post-exilic apocalypse, concerning the judgment on the world and the future blessedness of Israel, and may be assigned with probability to the later Persian period.

3. Chapters xxviii–xxxiii are substantially from Isaiah's hand, and belong chiefly to the time of his later activity. In chap. xxviii, Isaiah's earlier message against Samaria (vss. 1–6, before 722) is reiterated with reasons, in or about 704. In chapters xxix–xxxii we have in several paragraphs a representation of the straits to which Jerusalem was put just before 701 B.C., the futility of reliance on Egypt for help, the weakness of the Judean politicians, the indifference of the women of the capital, the ultimate deliverance of the city, the fall of Assyria, and the coming of the Messianic age (the latter in three passages, xxx, 18–26; xxxii, 1–8, 15–20; chap. xxxiii) is supplementary to this, contains a woe upon some power hostile to Jerusalem, and the prediction of Judah's deliverance. This is probably a post-exilic expansion of Isaiah's utterances in 701 B.C. The sections xxix, 16–24; xxx, 18–26; chap. xxxii, have been assigned by some writers to exilic or post-exilic times, and they may contain some elements from these periods.

No further prophecies in the book can be assigned with probability to our prophet.

4. Chapters xxxiv–xxxv form a post-exilic prophecy of 450 B.C., or later, and treat of Israel's victory over Edom and of the joyful circumstances of Israel's restoration.

5. Chapters xxxvi–xxxix are historical chapters taken in large measure from 2 Kings. The Isaian passage omits 2 Kings–xviii, 14–16, and introduces the song of Hezekiah (Isa. xxxviii, 9–20) before 2 Kings xx, 12.

6. Chapters xl–lv are a long and developed prophecy, and comprise the great exilic prediction of about 540 B.C. concerning the return of Israel from Babylonia, through the instrumentality of Cyrus. Omitting subdivisions, of which there are many, Skinner and others divide about as follows:

Chapters xl–xlviii, the restoration: (1) xl, 1–11, the theme; (2) xl, 12–31, the infinity of God; (3) chap. xli, the historical situation, as it has been brought about by God for his servant Israel; (4) xlii, 1–xliii, 7, the work of Jehovah's ideal servant (xlii, 1–4) for Israel and the world, and the contrast with the servant Israel as he is; (5) xliii, 8–xliv, 5, the witness of Israel's history to the divinity of Jehovah, and the salvation of Israel and the nations through the divine interposition; (6) xliv, 6–23, the folly of idolatry; (7) xliv, 24–xlv, 25, the mission of Cyrus, the anointed of Jehovah, for Israel and for a world-wide religion; (8) chaps. xlvi, xlvii, the fall of Babylon; (9) chap. xlviii, the closing argument, and the joyful summons to Israel to depart from Babylon and to de-

clare to the world their redemption by their God.

Chapters xlix–lv, the glorious future of Israel; (1) xlix, 1–13, the mission of the servant (vss. 1–6) to the world; (2) xlix, 14–l, 3, consolation for afflicted Zion; (3) l, 4–11, the perfection of the servant through suffering; (4) li, 1–lii, 12, the Israelites encouraged to accept the promises; (5) lii, 13–liii, 12, the servant's sacrificial work and his exaltation; (6) chaps. liv, lv, the felicity of Israel and the gracious call to accept the promised deliverance.

7. Chapters lvi–lxvi are probably for the most part of post-exilic origin, as they appear to contain detached messages of condemnation and promise to a people living in Palestine. Here there are details concerning the moral, social and religious duties of the people, and worship in the new temple appears to have been established. We divide: (1) lvi, 1–8, the admission of foreigners and eunuchs to the Israelitish community; (2) lvi, 9–lix, 21, a series of rebukes to several classes, interspersed with promises for fidelity; (3) chaps. lx-lxii, the new Jerusalem; (4) lxiii, 1–6, the divine hero in Edom; (5) lxiii, 7–lxiv, 12, confession of sin; (6) chaps. lxv–lxvi, the contrasted futures of true servants of God and apostates.

The principal idea of Isaiah, besides that of judgment, common to the prophets, was the deliverance from the foes of Jerusalem of the remnant of Israel, meditated by a righteous king. The principal ideas of Isaiah xl–lv are the deliverance of Israel from exile through Cyrus, and the deliverance of the people from sin and the impartation of spiritual graces through the suffering servant of Jehovah. Hope, therefore, is the keynote of this prophecy and comfort is the opening word. In connection with the theme, the prophet declares, in turn, after turn of speech, the reliability of God in bringing to pass his promises, the sublime grandeur of the Holy One, his creative power, the absurdity of idolatry. The writer makes it clear that the absolute and sole sovereign in the earth is Jehovah, the God of Israel. In Isaiah lvi–lxvi there is no advance upon these ideas, but many of them are reiterated there.

Bibliography.— Besides the appropriate sections in Encyclopedias, Old Testament Histories, Old Testament Introductions, Old Testament Theologies, works on Old Testament Prophecy and Messianic Prophecy, Dictionaries of the Bible, Histories of Assyria, Babylonia, Persia, Egypt and Syria, the following selected works may be consulted. For fuller lists the reader is referred to the articles in the Bible Dictionaries, and for the later books, to the lists of current literature in 'The Biblical World.' In the present list, works written in other languages and translated into English, are given in the translation only.

1. *Commentaries.*— Calvin (1850); Vitringa (1714–20, Latin); Lowth (1778); Gesenius (1821, German); Hitzig (1833, German); Ewald (1876–81); Henderson (1840); Umbreit (1846, German); Drechsler (1851–54, German); Alexander (1865); Delitzsch (1892); Reuss (1876, French); Nägelsbach in 'Lange' (1878); Birks (1878); Cheyne (1889); von Orelli (1889); G. A. Smith (1888, 1890); Duhm (1892, German); Skinner (1896, 1898); Guthe and Ryssel in 'Kautzsch' (1896, German); Mitchell (chaps. i–xii, 1897); Kittel's 'Knobel-Dillmann' (1898, German); Marti (1900, German); Whitehouse (1905).

2. *Other Works.*— Driver, 'Isaiah, His Life and Times' (1893); Davidson, 'Theology of Isaiah xl–lxvi' ('Expositor,' 1883–84); 'Theology of Isaiah' ('Expository Times' 1894); Guthe, 'Das Zukunftsbild des Jes' (1885); Giesebrecht, 'Beitrage zu Jes, Kritik' (1890); 'Der Knecht Jahves des Deuterojes' (1902); Hackmann, 'Die Zukunftserwartung des Jes' (1893); Cheyne, 'Introduction to Isaiah' (1895), Translation of Isaiah ii, 'Polychrome Bible' (1898); König, 'The Exiles' Book of Consolation' (1899); Davidson, 'The Servant of the Lord in Isaiah' (in *British and Foreign Evangelical Review*, 1872); Driver and Neubauer, 'The 53d of Isaiah according to Jewish Interpreters' (1876, 1877); Wright, 'Pre-Christian Jewish Interpretation of Isaiah LIII' (*Expositor*, May 1888); Lane, 'Die Ebed-Jahwe Lieder' (1898); Bertholet, 'Zu Jesaya LIII' (1899); Füllkrug, 'Das Gottesknecht des Deuterojes' (1900).

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ISAR, or **ISER**, a river of Germany, rising in the Tyrol, north of Innsbruck, entering Bavaria, then flowing generally north and northeast, and joining the Danube at Deggendorf, after a course of about 180 miles. Munich and Landshut are on its banks. In the first part of its course, it is an impetuous mountain torrent; and even after it leaves the Alps, it has many rapids and islands, but for much of its course it is navigable for boats. Much wood is floated down the Isar from the mountains.

ISARD, or IZARD, the chamois of the Pyrenees. It is smaller and redder than its cousin of the Alps. See CHAMOIS.

ISAROG, a mountain peak of Luzon, P. I., in the Province of South Camarines. It is an extinct volcano and rises to a height of 6,450 feet from a base about 35 miles in circumference.

ISAURIA, in ancient geography, a district of Asia Minor, bounded north by Phrygia, east by Lycaonia, south by Cilicia, and comprising a barren upland plain with mountains in the south. The district is supposed to have contained but few towns, chief of which was Isaura, the capital, which was rebuilt by Amyutas. Extensive ruins, consisting of a massive wall with hexagonal towers, a triumphal arch, and tombs, are still seen near the town of Hajilar, 45 miles west of Karaman. The people believed to have been a daring lawless race, owing allegiance to either the Persian or Macedonian monarchy, appear in history as having been driven to their mountain strongholds and forced to submission by the pro-consul P. Servilius; as giving the Roman empire so much trouble that it was decided to leave them alone; as being a second time subjugated in the reign of Justinian; and as giving two occupants to the Byzantine throne, Zeno (474–495) and Leo III (717–41). Consult Ramsay, Sir W. M., 'Historical Geography of Asia Minor' (London 1890) and 'Nova Isauria' (in *Journal of Hellenic Studies*, ib., 1905).

ISCA DAMNONIORUM, the Roman name of the Celtic Cær-Isc, the modern Exeter, Devonshire (q.v.), England.

ISCHIA, is'ke-a (the ancient *Ænaria*), an island between the Bay of Naples and the Bay of Gaeta, about 27 square miles in area and seven miles from the mainland. Ischia is a favorite summer resort, and is noted for the excellence of its mineral waters, and numerous springs, great richness of soil, exquisite flavor of its fruits and wines, and enchanting scenery. Its highest point is the volcanic Monte Epomeo, 2,588 feet above sea-level, of which the eruptions have been disastrous, especially that of 1302 The Lake of Ischia occupies an extinct crater of the volcano, and abounds in fish. Casamicciola, Forio, Borgo d'Ischia and Lacco Ameno are the principal towns. In 1881, Casamicciola was nearly destroyed by two earthquake shocks. A still more dreadful catastrophe befell it, 28 Sept. 1883, when the town was utterly overwhelmed, only four or five buildings being left standing. Pop. 28,000. Consult Beloch, J., 'Campanien' (Breslau 1890).

ISCHL, Austria, market-town and summer resort of Upper Austria, 55 miles southwest of Linz, at the confluence of the Ischl and Traun. It is picturesquely situated in the mountains about 1,500 feet above sea-level. It contains a fine church built by Maria Theresa, an imperial villa, a kurhaus, theatre, etc. There are a number of saline and sulphur springs, also brine and brine-vapor baths. There is a large salt mine in the vicinity which has been worked for 800 years. The salt industry is considerable. The imperial family and the nobility were accustomed to spend their summers here. Pop. 28,611.

ISE, Japan, a central province of the empire. See JAPAN.

ISEGHEM, Belgium, a town in the Province of West Flanders, five miles east of Roulers and 10 miles north of Courtrai. It has manufactures of lace, linens, and woolen cloths. Iseghem suffered severly in the Great War of 1914–18, being taken by the Germans in the autumn of 1914. It was practically razed by the bombardments incidental to the attack by the Allied forces in Sept.-Oct. 1918 and was freed from the invader before the armistice was signed (11 Nov. 1918). Pop. 14,000.

ISEO, Lake, or **LAGO SELINO,** a lake of northern Italy, between the provinces of Bergamo and Brescia. Its extreme length from north to south is 17½ miles and is three miles wide in the broadest portion. Its greatest depth is said to be 984 feet, and it is 607 feet above sea-level. On its banks is the town of Iseo. The lake is fed by the rivers Oglio and Borlazzo. The surrounding scenery is very interesting, broken into picturesque heights, and studded with fine villas, vineyards and olive-gardens. Sardine and eel-fishing are carried on.

ISÈRE, France, department of the southeast, part of the old province of Dauphiné, bounded north and west by the Rhone, east by Savoy, south and southeast by Drome and Hautes-Alpes. Its area is 3,179 square miles, about 50 per cent of which is arable and 20 per cent forest land. The surface is level in the north, but becomes very mountainous toward the south, where the scenery is magnificent. It is drained by the Rhone, and its tributary streams, the Isère, Drac and Romanche. The department is rich in minerals. Coal, iron, lead, silver, gold and marble are mined and the forest products are far from negligible. Gloves, paper and silk are manufactured. Grenobile is the capital. Pop. 559,900.

ISÈRE, e'zar, a river of the southeast of France, which takes its rise in Savoy at the foot of Mount Iseran, flowing generally southwest through Savoy and through the departments of Isère and Drome, and joining the Rhone about six miles above Valence. Its entire length is about 190 miles, for the last 70 of which it is navigable.

ISERLOHN, Prussia, town in the province of Westphalia, on the Baar, 30 miles northeast of Barmen. It is a thriving manufacturing centre, having numerous foundries, brass, iron, steel and bronze mills, wire, needle, pins and hook works, silver and nickel ware factories, chemical works, furniture and machine works. Mines beneath the town produce zinc and cadmium. The town has a technical school. Pop. 31,294.

ISERNIA, Italy, city in the province of Campobasso, 80 miles north of Naples. It contains several medicinal springs and is situated at an elevation of 1,495 feet. In the neighborhood are the ruins of the ancient Samnite town. Linen and pottery are the only manufactures of any consequence. Pop. 9,284.

ISEULT, ISOLD, ISOLDE, ISOND, ISOUD. See TRISTAN.

ISHAM, Samuel, American artist: b. New York, 12 May 1855; d. 12 June 1914. In 1875 he was graduated at Yale University; studied law and was admitted to the bar. He soon turned from the law, however, and went abroad to study art at the Julian Academy, Paris. He frequently exhibited at the Paris salon and also in America. In 1906 he was made a National Academician. His fame, however, rests not on his artistic productions but on his 'History of American Painting' (New York 1905), the best work which has appeared on this subject, remarkable for its sympathetic and just appreciation.

ISHII KIKOJIRO, ē-shē-ē' kē-kō-jē-rō, Ambassador from Japan to the United States: b. at Chiba in 1866. Educated in the Imperial University in Tokio, he was graduated from the School of Law in 1890. Entering upon a diplomatic career, he acted as attache and secretary of the French legation. Was consul at Chemulpo, Korea, in 1896. Transferred to the secretaryship of the legation in Peking, he was in the siege by the Boxers; and by the Chinese troops — after the allied fleets had opened fire on the Taku forts. After holding other offices, was sent to San Francisco and Vancouver in connection with the anti-Japanese riots. Served as Vice-Minister of Foreign Affairs in 1908, and was Ambassador to Paris, but was recalled to be Minister 1915–16. In 1917 he was dispatched to the United States, forming the Lansing-Ishii agreement, and was appointed Ambassador to Washington in 1918. Besides being versed in French, he is a fluent speaker

and writer in English. Greatest of all his achievements was his early discernment and penetration of Germany's purposes in the Far East and in the world. In this field his activity in exposing the reality to his countrymen has been remarkable. His speeches at Fairhaven and Boston, Mass., in July 1918 were masterpieces.

ISHIM. (1) A town of western Siberia, government of Tobolsk, 180 miles northwest of Omsk, on the Ishim. It is the seat of a great fair and has a large trade in flour and grain. It was founded in 1630. Pop. 7,000. (2) A river of Siberia, a tributary of the Irtysh. It rises in eastern Akmolinsk, flows first toward the west, then the northwest to its juncture with the Irtysh. Its total length is about 1,000 miles, of which only 100 are navigable. It is ice-bound for over five months each year. At Petropavlovsk it is crossed by the Trans-Siberian Railway.

ISHMAEL, ĭsh'mā-ĕl, from Hebrew, signifying «God hears,» was eldest son of Abraham and Hagar, his handmaid (Gen. xvi, 15, 16). Of him it was foretold (Gen. xvii, 18, 20) that he would beget 12 princes and become a great nation — a promise repeated (Gen. xxi, 18) to his mother when, driven from home by Sarah's attitude, both she and the lad were wandering in the territory south of Beersheba and death by thirst was near. Later he became an archer, dwelling in the wilderness of Paran, where Hagar «took him a wife out of the land of Egypt» (Gen. xxi, 21). In a later chapter (Gen. xxv, 9–18) it is stated that he died at the age of 137, having had, like Jacob, 12 sons, progenitors of 12 tribes that dwelt from «Havilah unto Shur, that is before Egypt, as thou goest to Assyria.» Apart from the Biblical record few of the names have historical associations. Among various identifications more or less plausible may be mentioned Nebaioth with the Nabatæans, Yetur with Ituræa, whose archers were early Roman mercenaries; Kedar with the Kidru of the Assyrian inscriptions.

In the Midrash, the rabbis show how Sarah's disposition to Hagar was at first kindly but that Hagar's actions compelled a change. Ishmael's intercourse with Isaac is told with considerable minuteness at times, as when he invites his five year old brother to a contest with the bow and arrow and aims at the child in his duplicity. When Ishmael was at the point of death, God heard his prayer and caused a well to bubble forth that later was to refresh the Israelites on their journey through the wilderness. Beer's 'Leben Abraham' gives these and other anecdotes of the kind. His marriage, Abraham's first visit to his son and how the son's wife repelled him and its consequences for her; the second visit three years later and how Ishmael at last went to Canaan and settled with his father; all this and more is narrated with an imaginative skill peculiar to the Midrash. In Arabic legend Ishmael is no less a picturesque figure and the Koran adds to his importance for it calls him a prophet (Koran XIX, 55). His son Kedar is reported to have been an ancestor of Mohammed. It is characteristic of Mohammedan tradition that Ishmael should be offered as a sacrifice instead of Isaac. (Weil's 'Leg. der Musel,' pp. 85–93). It is doubtless due to the fact that Mohammed is claimed to be a descendant of Abraham that Ishmael and the Ishmaelites received such exaggerated attention. Early associated with the caravan trade between Africa and southern and western Asia, we cannot tell historically how far the descendants of Ishmael entered Arabia and settled there, with its mixed population of thousands of years. Possibly the Bedouins in the deserts between Sinai Peninsula and the Persian Gulf are more entitled to claims of Ishmaelitish origin with their primitive and patriarchal form of life and ancient traditions.

ISHMAELITES. See ISHMAEL.

ISHMAILIS, ĭsh-mā'lēs, one of the 72 heretical sects of Mohammedanism (q.v.).

ISHPEMING, ĭsh'pē-mĭng, Mich., city in Marquette County; on the Duluth, South Shore and Atlantic, the Chicago, Milwaukee and Saint Paul, and the Chicago and Northwestern railroads; about 14 miles west of Marquette. It was settled about 1856 and received its first charter in 1857. It is situated in the great iron ore region of Michigan, and is the centre of the iron ore mining industry of the State. Gold and marble are found in the vicinity and an excellent building stone. The manufactures are chiefly the machinery used in mining. There are several church edifices, large school buildings, hospitals, a Carnegie library and municipal owned waterworks. Civic affairs are administered by a mayor and city council of 20 members elected annually. The population is composed mainly of Scandinavians and English. Pop. 12,448.

ISHTAR. See BABYLONIA.

ISIAC TABLE, monument much esteemed and quoted by archæologists previous to the discovery of hieroglyphics, being a flat rectangular bronze-plate, inlaid with niello and silver, about four feet, eight inches long by three feet high. It was sold by a soldier of the Constable de Bourbon to a locksmith, and bought of the same by Cardinal Bembo, in 1527, passed after his death to Modena, and finally to Turin, where it is now deposited. It consists of three rows of figures of Egyptian deities and emblems. Its object was long supposed to have been votive; but it is now recognized as a very late or spurious monument.

ISIDORE OF SEVILLE, Saint. See ISIDORUS.

ISIDORUS, Spanish ecclesiastic: b. Carthagena, between 560 and 570; d. 4 April 636. As bishop of Seville (from about 600) he played a leading rôle in all affairs of church and State, and in his influence upon the thought and literature of the whole Middle Ages he is to be ranked as second only to Boëthius and Cassiodorus Senator. Among his numerous theological, historical and grammatical writings, the 'Etymologiae' or 'Origines' should be mentioned. His works are chiefly valuable to-day for their quotations from earlier writers. The best edition is in Migne's 'Patrologia Græca' (Vol. LXXVIII, 1860). Consult also Niemeyer, H. A., 'De Isidori Pelusiotœ Vita, Scriptis et Doctrina' (Halle 1824).

ISINGLASS, ī'zĭn-glȧs, a form of gelatine (q.v.), whitish, firm in texture, and of great purity, prepared mainly from the sounds or air-bladders of different species of fish, especi-

ally of the Russian sturgeon and, in this country, of cod, sturgeon, hake, etc. In some cases the skins are also used for this purpose. Besides Russia, from which it had been principally obtained, the United States and Canada, Brazil and the East Indies furnish considerable quantities to commerce, as do also Manila and the West Indies. It is the basis of the Russian glue, preferred to all other kinds for strength. Isinglass receives its different shapes in the following manner: The sounds are taken from the fish while sweet and fresh, slit open, washed from their slimy matter, divested of a very thin membrane which envelops the sound, and then exposed to stiffen a little in the air. In this state they are formed into rolls about the thickness of a finger, and in length according to the intended size of the staple; a thin membrane is generally selected for the centre of the roll, around which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inward. Boiled in milk, it forms a mild nutritious jelly, and is thus sometimes employed medicinally. It is used in making court-plaster, cement, mock pearls, and many other articles, also in clarifying fermented liquors for improving soups, jellies, etc., and as sizing for linens, silk, gauzes and other fabrics.

ISIS, the principal goddess of the Egyptians, the sister and wife of Osiris, representing the moon, as Osiris did the sun. The Egyptians believed that Isis first taught them agriculture. She is represented in various forms. In one she has the form of a woman, with the horns of a cow, as the cow was sacred to her. She is also known by the attributes of the *lotus* on her head, and the *sistrum* in her hand, a musical instrument which the Egpytians used in the worship of the gods. She is often accompanied by her infant son Horus. In one celebrated Egyptian statue she was shown with her face veiled. It was she who, by wiles, learned the name of the great Rē which no one else knew. She is also represented in legends as mourning for Osiris with her sister Nephthys. Herodotus identifies her with the Greek Demeter. The same author states that the worship of Isis and Osiris was the only common ritual throughout Egypt. She was particularly worshipped in Memphis, but at a later period throughout all Egypt. From Egypt her worship passed over to Greece and Rome, in about the third century B.C. The initiation of the novitiates and the celebrations of the mysteries of Isis were great dramatic spectacles. Traces of the cult have been found in Great Britain, also. In Italy, it was not suppressed until after the 5th century B.C. Consult Budge E. A. W., 'Gods of the Egyptians' (London 1904).

ISIS AND SERAPIS, Temple of, a structure of ancient Rome, situated in the Campus Martius. It was erected from Egyptian materials and in Egyptian style and the approach was lined with many monuments brought over from Egypt. Of these there remain in Rome three obelisks, and the Nile statuary group, the latter in the Vatican Museum. The Tiber statue reposes in the Louvre since 1803. Various smaller pieces have been recovered.

ISKANDERUM, Turkish form of Alexandretta, a city of Syria (q.v.).

ISLA, ēs'la, **José Francisco de la,** Spanish literary man and ecclesiastic: b. Vidanes, in the province of León, 24 April 1703; d. Bolonia, 2 Nov. 1781. His father was governor of the district and a man of some importance. José was a boy of very superior ability, the development of which the father encouraged, with the result that the son received his bachelor's degree in law at the age of 12. Four years later he entered the Jesuit order, and after three years' study of theology and associated subjects, he went to Salamanca to continue his ecclesiastical studies. On leaving Salamanca he became a teacher of theology and philosophy in various Jesuit colleges. He was noted as a preacher and his fame as an orator rapidly spread. The Jesuit authorities gave him plenty of opportunity in this line. Isla translated into Spanish, from Latin, French and other languages, numerous devotional and other works with such success that often the translation proved better than the original. He also devoted much of his time to historical and other investigations and original writing. Of these the most notable is 'Fray Gerundio de Campazas' a satire on the extravagances of the preachers of his day (Madrid 1758). The ridicule cut so deep that it was never forgiven by some of his fellow preachers; and they raised up for him powerful enemies who finally succeeded in having the sale of 'Fray Gerundio' prohibited, not however, until it had become popular throughout Spain and had been translated into several languages of Europe, among them, English, French, German and Italian. Notwithstanding the ecclesiastical censure which prohibited the publication, reading, possessing or even discussing the book, it continued to be printed in Spain and abroad, and an edition of 1,500 was sold out in three days in Madrid alone. Among the excellent translations of Islas are 'Friendship and Old Age' (Cicero), and 'Satires' of Lucretius. In 1767 he was exiled from Spain with the rest of the Jesuits by royal decree, and took up his residence in Italy. There he was arrested and imprisoned for defending the Jesuits (1773). Three years later satisfaction was given him and he returned to Bolonia.

Among the other published works of Isla are 'Cartas de Juan de la Encina' (satire); 'Cartas Familiares'; 'Several volumes of sermons'; and 'Reflexiones Cristianas.' Among his most popular translations was 'The Adventures of Gil Blas de Santillana.'

ISLA DE LEON, island on the south coast of Spain, in the Atlantic Ocean, belonging to the Province of Cadiz, and separated from the mainland by Santi Petri channel. It is 10 miles long and two wide, and contains the cities of Cadiz and Isla de Leon, the latter known also as San Fernando, the capital of Spain under the regency in 1810, and the scene of the constitutional movement of 1820. The old capital has good fortifications, hospitals, an observatory, convents, etc., and manufactures leather, salt, soap and spirits. Pop. of the island about 18,000.

ISLA DE PINOS. See ISLE OF PINES.

ISLAM, a term which signifies the Mohammedan religion; complete submission of body and soul to God, His will and His service, as well as faith in all those articles of profes-

sion, commands and ordinances ordained by Mohammed. See MOHAMMEDANISM.

ISLAND, a body of land entirely surrounded by water. Islands are of very different extent and surface, and some are so large that physical geographers have doubted whether they should be called continents; this, however, is a mere matter of definition. The great masses of land forming the Eastern and Western Continents are in reality islands. A convenient distinction is established by restricting the application of the noun, continent to North, Central and South America, Europe, Asia and Africa; designating Australia as a continental island; and classing Greenland (estimated area 826,000 square miles) as simply the largest of the islands, strictly so called. The following table shows the relative areas of other large islands:

Islands	Area in sq. m.	Islands	Area in sq. m.
New Guinea	303,000	Mindanao	37,000
Borneo	284,000	Ireland	32,600
Madagascar	227,000	Haiti	28,800
Sumatra	162,000	Tasmania	26,200
Honshu	86,500	Ceylon	24,700
Great Britain	83,700	Nova Zembla — (N. Island)	19,300
Celebes	76,500	Tierra del Fuego	18,500
New Zealand — (S. Island)	58,500	Nova Zembla — (S. Island)	15,700
(N. Island)	44,467	Formosa	15,000
Java	49,000	Hainan	14,000
Cuba	44,164	Sicily	9,800
Newfoundland	40,200	Sardinia	9,000
Luzon	40,000		
Iceland	40,300		

A cluster of several islands is called an archipelago. The principal clusters in the Atlantic are the West Indies, the Azores, the Canaries, the Hebrides, Orkneys, Shetlands, etc. But the great world of islands is in the Pacific, and some modern writers consider them as forming a fifth division of the world, including the Eastern Archipelago, Polynesia and Australia, to which they have given the name of Oceania. A large island is a continent in miniature, with its chains of mountains, its rivers, lakes, and is often surrounded by a train of islets. The rivers of islands are in general little more than streams or torrents, and the smaller islands are often uninhabitable from want of water; but they serve as haunts and breeding-places of innumerable sea-birds. There are islands in rivers and lakes as well as in the sea. In rivers they are often formed by the division of the stream into various branches, and often by accumulations of earth brought down and deposited around a rocky base. Examples are not wanting of floating islands, which are formed by the roots of plants and trees interlacing with each other, and thus constituting a support for deposits of successive layers of earth. The Pacific contains a great number of low islands having their basis formed of coral reefs, these reefs being produced by the labors of innumerable coral-animals or zoöphytes. See CORAL AND CORAL ISLANDS.

ISLAND BOUNDARIES. See BOUNDARIES OF THE UNITED STATES.

ISLAND NUMBER 10, a former island in the Mississippi River, near the northwestern corner of Tennessee, and about 40 miles below Columbus, Ky. Since the Civil War it has been washed away. It was the tenth in a succession of islands lying below Cairo, Ill. Early in 1862, having been fortified by the Confederate, General Polk, it was commanded by General Mackall, who had about 7,000 troops of Beauregard's army. It was bombarded for three weeks by Commodore Foote, commanding seven Federal gunboats, and surrendered 7 April 1862. The evacuation was forced by Polk with a large land force. He, under cover of a vigorous fire from two gunboats, which had run past the island by night, brought his men across the river in transports. The defenders of the batteries fled, and were pursued into the swamps. Over 6,000 prisoners were taken, together with an immense quantity of ammunition and supplies. The Federal forces lost only a few men. Consult the Century Company's 'Battles and Leaders of the Civil War,' (Vol. I. New York 1901).

ISLAND OF SAINTS AND SCHOLARS, (Insula Sanctorum et Doctorum) a name frequently applied to Ireland in the early Middle Ages, because of the great number of missionaries and learned men who at that time left her shores to evangelize and teach the peoples of western Europe.

ISLANDS OF THE BLESSED, or FORTUNATE ISLANDS, according to Greek mythology and legend an island group on the edge of the western ocean, where dwelt those fortunate beings on whom the gods bestowed immortality. Heriod mentions the group as do later authors. It is supposed that the idea of this paradise on an island group is due to the remembrance of an unrecorded voyage to Madeira and the Canary Islands, these being called Fortunate Islands in some mediæval maps.

ISLAY, an island on the west coast of Scotland, belonging to the group of the Inner Hebrides, and to the county of Argyll. It is west of the peninsula of Cantyre, about 15 miles southwest of Jura, from which it is divided by Islay Sound. It is 24 miles long, with an extreme width of 17 miles, and an area of 220 square miles. In the north the surface is hilly, the east is marked by a high ridge while the central and western parts of the island are rolling or table-land. Great quantities of whisky are distilled. Pop. 6,274.

ISLE OF MAN, in the Irish Sea, 16 miles south of Burrow Head, Wigtownshire, the largest island in the English seas. Area, 145,325 acres. A range of mountains crosses from northeast to southwest, culminating in Snaefell (2,034 feet), to the summit of which there is a railway. In the southwest the coast is rugged and precipitous. There are valuable lead ore mines, and the fisheries are very productive.

The principal towns are Douglas, Castletown, Ramsey and Peel. Castletown is the ancient capital, but Douglas (pop. 21,183) is the chief town and the seat of government, which is "home rule" under a lieutenant-governor, who, with council and House of Keys of 24 members, makes up the Tynwald Court. The Manx people are a distinct Celtic nationality. Their language and old customs are rapidly disappearing but the laws are still promulgated in the Manx, a variation of Gaelic. There are notable Druidic and Runic remains. The island, which at one time belonged to the Scottish Crown, came into the possession of

the Stanleys (afterward Earls of Derby) in the 15th century; was captured by the Parliamentary forces in 1651 after a heroic resistance by the Countess of Derby; was given to General Lord Fairfax but possession by the Derby family was resumed at the Restoration; by inheritance it passed in 1736 to the Dukes of Atholl; and in 1829 was purchased by the Crown. The island is the most popular holiday resort in the British Isles. Pop. 52,016.

ISLE LA MOTTE, Vt., in the northern part of Lake Champlain, the northern point about eight miles from Rouse's Point, N. Y., on the Canadian border; the southern point about 15 miles north of Plattsburg, N. Y. It is about seven miles long and two miles wide. The island was a resort for the Algonquin and Iroquois Indians; at the south end was once an Indian village. It was discovered by Samuel de Champlain in July 1609 and was named after a French officer, Sieur La Mothe. In 1665 a wooden fort called Fort Sainte Anne was built on the south shore. The 'Jesuit Relations' contain numerous references to Fort Sainte Anne, Isle La Motte, and the visits made to this island by the early missionaries. The chapel of Sainte Anne, erected near the ruins of Fort Sainte Anne, was consecrated 16 July 1893 by Bishop De Goesbriand of the diocese of Burlington, and it is now a place of pilgrimage. On 8 Aug. 1776, Benedict Arnold, after engaging the Indians in the British service on 6 August, at the Bouquet River, fell back to Isle La Motte, where his fleet remained anchored until 19 August, when he sailed south toward Cumberland Head. Isle La Motte was settled in 1785 by Ebenezer Hyde, Enoch Hall and William Blanchard and was organized as a town in 1790. It has large marble quarries, two public schools, a Methodist church, town hall and a government lighthouse.

ISLE OF PINES (Isla de Pinos, ēs'lā dā pē'nōs), a small island belonging to Cuba, 40 miles southeast of Pinar del Rio. Area, about 840 square miles; pop. 3,300; chief towns, Nueva Gerona the capital on the north coast, and Santa Fé. It is in effect two islands connected by a marsh, the one on the north being somewhat broken by hills, the one on the south low, flat and sandy. The climate is healthful, the soil fertile producing citrus fruits, pineapples and potatoes, and the mineral resources extensive. Large marble quarries are worked. Cattle raising is the chief occupation of the inhabitants. The local industries are largely in the hands of Americans, and the island had prominent political significance prior to Cuban independence from the attempts of local agitators to bring it under the control of the United States. For administrative purposes the island is a municipal district of the province of Havana.

ISLE ROYALE, roi-ąl, (Fr. ēl rwä yāl), Michigan, an island in Lake Superior, 45 miles long, 9 miles wide with an area of 229 square miles. Valuable mineral deposits are found here.

ISLE VERTE, Canada, town on the Saint Lawrence at the mouth of the Isle Verte, opposite the island of the same name, in Temiscouata County, Quebec, and on the Intercolonial Railway. Most of its population are French-Canadians. Pop. 2,169.

ISLE OF WIGHT, wīt, England, the second largest island in the English seas, near the Hampshire coast. Its extreme length, from the Foreland to the Needles, is about 23 miles, and its extreme breadth, Cowes to Saint Catharine's Point, is about 13 miles. The area is calculated at 145 square miles.

ISLES OF SHOALS, New Hampshire, a group of eight barren islands in the Atlantic Ocean, 10 miles southeast of Portland, Maine, from which a daily steamer plies during the summer months. The three principal islands are Appledore (400 acres); Star (150 acres) and White (55 acres). There is a revolving government light on the last named, 87 feet above the sea. On Star and Appledore islands are several large hotels for summer visitors. A few fishermen are numbered among the permanent inhabitants.

ISLETA, New Mexico, an Indian pueblo or town on the Rio Grande, below Albuquerque. It is inhabited by Indians of Tanoan stock. They still retain much of their ancient social organization; are peaceable, industrious and cultivate the land by a primitive irrigation system. Pop. 956.

ISLINGTON, ĭz'lĭng-tŏn, England, a metropolitan and parliamentary borough of London, two and one-half miles north of Saint Pauls. Area, 3,091 acres. The Agricultural Hall in Liverpool Road is the second largest hall in London with a capacity for 50,000 persons. London Fever Hospital and Holloway prison, are within the borough, which returns four members to Parliament. Pop. 327,403.

ISLIP, ĭz'lĭp, N. Y., town in Suffolk County, Long Island; on the Great South Bay and on the Long Island Railroad, 44 miles east of New York. The town comprises several small villages and covers an area 20 miles long and 10 miles wide. Here are the Manhattan State Hospital for the Insane, Saint Joseph Convent (Roman Catholic), and a large fish hatchery, owned by the State. The town is popular as a summer resort and has many fine hotels along the shores of the bay. Fire Island lighthouse, 166 feet high, is located eight miles from the mainland. Blue Point oysters are shipped from the town in large quantities. The government is vested in a town supervisor and town board, elected every two years. Pop. 18,346.

ISMAIL I, Khedive of Egypt: b. Cairo, 31 Dec. 1830; d. near Constantinople, 2 March 1895. He was a son of Ibrahim Pasha; was educated in Paris; opposed Abbas Pasha, who succeeded his father in 1848 and was succeeded by Said Pasha in 1849. Ismail became commander of the Egyptian army in 1862; succeeded to the vice-royalty on 18 Jan. 1863 and by increasing his tribute and aiding the Sultan with his army in the Cretan insurrection of 1866, he secured from the Sultan the direct succession of his line, and in 1867 the titles of highness and khedive. Ismail increased his army, assumed jurisdiction over the Upper and White Nile, and sought to establish himself as an independent monarch in 1868–69. He was forced to reduce his army, recall orders for war-vessels and cease

contracting loans in Europe. Subsequently he obtained concessions from the Sultan which made him practically independent. He was one of the most zealous promoters of the Suez Canal, became very wealthy by growing cotton during the American Civil War, and improved Egypt vastly, but at a cost which destroyed the country's credit and brought about the intervention of England and France in Egyptian affairs. Ismail was deposed, 26 June 1879, and retired to a palace on the Bosporus where his remaining years were spent in virtual imprisonment.

ISMAIL, Russia, capital of the district of Ismail, Bessarabia, on the Kilia, on the frontier of Rumania. It contains flour mills, a tannery, brickyards, potteries, etc. It has steamer communication with ports on the Danube and the Black Sea. Its trade is very large, especially in agricultural produce, grain, etc. The city has had an eventful history, being successively the prey of Turk, Cossack, Slav and Russian. Pop. 35,700.

ISMAILIA, Egypt, town on the Isthmus of Suez, the central station on the Suez Canal, 50 miles from the Mediterranean and 93 miles northeast of Cairo by rail. It dates from 1863 during the construction of the canal. It is well laid out and has wharves, warehouses, etc. Pop. about 10,000.

ISOBAROMETRIC LINES, lines connecting on a map the places which exhibit the same mean difference between the monthly extremes of the barometer. These oscillations are greater in some countries, as Hindustan and Newfoundland, than in others, as western Europe and the Antilles.

ISOCLINES. See FOLDS.

ISOCRATES, ī-sŏk'ra-tēz, one of the 10 Attic orators: b. Athens, 436 B.C.; d. there, 338 B.C. His principal teachers were Tisias, Gorgias, Prodicus and Protagoras. On account of his weak voice and natural timidity he was reluctant to speak in public, but gave lessons in the art of eloquence, and composed orations for others. His school was opened about 392 B.C. and quickly gained a great reputation. People from many parts of Greece and even from Sicily and still more distant regions streamed to it. Isaeus, Ephorus, Lycurgus, Hyperides were amongst them. He thus made considerable profit, for he received twenty talents ($14,375) for a speech that he wrote for Nicocles, king of Cyprus. He was the first who saw the value of oratory in public life. By basing it on sound moral principles he rescued it from the abuses of the Sophists. He was distinguished for a polished style and a harmonious construction of his sentences. The composition, revision and repeated polishing of his speeches occupied so much time that he published little. His celebrated panegyric on Athens 'Panathenaicus' employed him 10, or according to others, 15 years. As all his speeches were modeled after the same pattern, their sameness excited weariness, although his subjects were the most important points of morals and politics. During the rule of the Thirty Tyrants he lived at Chios. His patriotism was sincere, and his desire for the freedom of Greece so intense, that he starved himself to death in his ninety-eighth year from grief at the battle of Chæronea, "fatal to liberty." Isocrates left an indelible impress on the cultural and political development, not only of Greece, but of the whole world through the purity of his style, the loftiness of his political ideas and ideals, and through the influence which he exerted over such men as Demosthenes, Cicero, etc. In Plutarch's time 60 orations went under his name, not half of which were, however, deemed genuine. Twenty-one now remain, of which the principal are the 'Panegyricus' (an oration in which he exhorts the Greeks to concord, and to war against the Persians), the 'Panathenaicus' (in which he dilates on the services rendered by Athens to Greece), and the 'Areopagiticus' (in which he advises the Athenians to return to the simplicity and purity of Solon's time). Plato spoke of him in laudatory terms in his 'Phaedrus,' and so did Cicero in his 'De Oratore.' There are many editions both of his complete works and of separate orations. The most important are by Bekker, I (Oxford 1823); Dobson, W. S., (London 1828); Baiter, J. G., and Sauppe, H., (Zürich 1838); Benseler, G. E., (2 vols., Leipzig 1886). A good list of the others will be found in British Museum, 'Catalogue of Printed Books.' A representative selection of his work is contained in Jebb, R. C., 'Selections from Attic Orators' (London 1880). There are also a number of translations of which the most important are: English (London 1894, in 'Bohn's Classical Library'); French (3 vols., 1862–64); German (2 parts, Leipzig 1854–55). Consult Adams, C. D., 'Recent Views of the Political Influence of Isocrates' (in *Classical Philology,* Vol. VII, p. 343, Chicago 1912); Bell, H. I., 'The British Museum Papyrus of Isocrates, *περὶ Εἰρήνης*' (in *Journal of Philology,* Vol. XXX, p. 1, London 1907); Blass, F., 'Attische Beredsamkeit' (2 vols., Leipzig 1887–93); Id., 'Die Rhythmen der Attischen Kunstprosa' (Leipzig 1901); Burgess, T. C., 'Epideictic Literature' (Chicago 1902); Christ, W. von, 'Geschichte der Griechischen Literatur' (5th ed., 3 vols., Munich 1908–13); Gomperz, H., 'Isokrates und die Sokratik' (in *Wiener Studien,* Vol. XXVII, p. 163, Vol. XXVIII, p. 1, Vienna 1905–06); Hubbell, H. M., 'The Influence of Isocrates on Cicero, Dionysius and Aristides' (New Haven 1913); Jebb, R. C., 'Attic Orators from Antiphon to Isaeus' (2 vols., London 1876); Johnson, A. C., (A Comparative Study in Selective Chapters in the Syntax of Isaeus, Isocrates, etc., (Athens 1911); Kessler, J., 'Isokrates und die Panhellenische Idee' (Paderborn 1910); Oncken, W., 'Isokrates und Athen' (Heidelberg 1862); Pöhlman, R. von, 'Isokrates und das Problem der Demokratie,' (Munich 1913); Preuss, S., 'Index Isocrates' (Leipzig 1904); Robbins, 'Isocrates' (in *Bibliotheca Sacra,* Vol XXXV, pp. 401, 593, Andover 1878); Sanneg, P., 'De Schola Isocratea' (Halle 1867); Spengel, L., 'Isokrates und Platon' (in *Königl. Bayer. Akad. der Wiss., Abhandlungen, Philos.-Philol. Kl.,* Vol. VII, pt. 3, p. 729, Munich 1855); Thompson, W. H., 'On the Philosophy of Isocrates and his Relation to the Socratic Schools' (in 'The Phaedrus of Plato,' London 1868); Volkmann, R., 'Rhetorik der Griechen und Römer' (Berlin 1872); Wendland, P., 'König Philippos und Isokrates; Isokrates und Demosthenes' (in *Nachrichten von der Königl. Gesellschaft der*

Wissenschaften zu Göttingen, Philolog.-Hist.-Kl., Göttingen 1910).

ISODIMORPHOUS SERIES. See Isomorphism.

ISODYNAMIC LINES, lines of equal force, equal inclination and equal declination; three systems of lines which being laid down on maps, represent the magnetism of the globe as exhibited at the earth's surface in three classes of phenomena, the varying intensity of the force, the varying dip or inclination of the needle, and its varying declination from the true meridian. See Magnetism, Terrestrial.

ISOETALES, ī-sō-ĕ-tā'lēz. See Ferns and Fern-allies.

ISOLA GROSSA or **ISOLA LUNGA,** one of the many islands off the west coast of Dalmatia, in the Adriatic Sea. It extends between 43° 51′ and 44° 11′ north latitude. Its greatest length is 27 miles, greatest breadth, three miles. Figs, grapes and olives are produced and the fisheries are important. Sale is the chief town and port. Pop. 4,000, mostly Croats.

ISOLA DEL LIRI, Italy, town of Campania, in the Province of Caserta, on the Rome-Naples Railroad, 15 miles northwest of Roccasecca, on the Liri. It has an interesting 12th century church and ample water power from the falls on the river. Manufactures are unimportant. Pop. (town) 2,400; (commune) 8,244.

ISOLATION, applied in common parlance to the act of secluding, and of making "pure"; and also to the state of being alone, of being separate; to the states of exclusion, seclusion, or of insulation, and thus of being free from influences such as are incident to contact and conjunction,— in short, a state of "purity"— is a word which has several specific meanings in science.

A. *In philology.*—(1) To denote that process by which a word-form receives a character which distinguishes it as a compound from the parts of which it was composed, and also from any other group of words connected merely in some syntactical relation. Latin *māgnōpere,* for instance, was isolated from its component elements *māgnó* and *opere* by its vowel contraction, here the cause of the process. So also was the Homeric *πᾶν ἦμαρ* or "all-day-long," *isolated* owing to the circumstance that the neuter when used independently takes a long "a" from *πᾶς, πασα*; (2) To denote the similar process by which verbal abstract nouns become infinitives, or supines. An infinitive may be said to be completely formed through isolation when the substantive denoting activity or a state, that is when a verbal abstract noun or *nomen actionis* is no longer regarded as a case form, and its construction no longer follows the analogy of its original use as a noun. This is true, for example, of the Greek *δόμεναι δόῑναι* and Latin *dare* at the earliest period of which Indo-European philology has any record. By this process of isolation, the infinitive word-form reached its most characteristic development in Latin and in Greek. For these are the only languages of the whole Indo-European group in which one finds a special expression for differences of voice. This kind of isolation seems to have had least influence in the Irish tongue, where the *nomina actionis* retains the construction of nouns. Even the ancient language of the Veda is said to show in this respect a further degree of development than the so-called Irish infinitive; (3) To denote that characteristic device of juxtaposing words in a definite order in some languages (of the so-called isolating type) to express relational concepts, all words themselves remaining unchanged and unchangeable units, and thus receiving their various relational values, *not* from grammatical modifications, but from the position which they occupy in the sentence. Chinese affords a classical example of such a language. And it is a most interesting fact that English itself has ceased to be a clear example of the so-called inflective type, and may be said to be an example of an isolating language in the making. When comparative grammarians had succeeded in subjecting the entire content of mankind's linguistic power to careful scrutiny and critical examination, three main types of speech emerged. These groups were found to be co-ordinate; and tongues were thereafter distinguished as isolating, agglutinative, and as inflective for taxonomic reasons. This resulted when special regard was paid to the inner coherence of words, a characteristic produced in all tongues by the operation of various specific grammatic processes. In all such investigations attention was directed in particular to the relative degree of unity which the stem or unmodified word plus its various grammatical increments or modifications possesses, emphasis being always laid on the degree of unity which grammatical processes bring about between the stem and the increments which express relational concepts. On the basis of this formal criterion, emphasis being laid on the characters called inflection, agglutination, and isolation respectively, all the languages in the world can be classified into three main divisions or types, as inflectional, agglutinative and isolating types respectively.

B. *In chemistry,* isolation refers to the state of any substance when separated from all foreign elements; and also to the act or method of obtaining such a substance in a free state, or of rendering it pure.

C. *In physics* it has a similar meaning. It was in this sense that the classical experiments of R. A. Millikan, by which he succeeded in isolating an *ion,* were performed.

D. *In phylogeny* (theories of descent and *in ontogeny* (developmental history), isolation conveys in general the idea of freedom from crossing with the parent, or other, stocks, in the broader meaning which has been given to the term since the days of Charles Darwin. In this sense isolation is synonymous with biological and ecological separation; and also with habitudinal segregation. Isolation and all its synonyms, signify that the descendants of *one* ancestral form living amid a definite set of ecological, or environmental conditions, begin to adapt themselves to different sets of conditions, as a result of which, they become ecologically separated or segregated. Isolation with three other factors may enter into any process of speciation,— the latter name being applied by O. F. Cook to the process, the operation of which brings about the differentiation of one species into several coexisting species by the prevention of free crossing between groups

existing at the same time. It is above all the setting of individuals in groups, the members of each group intergenerating, and so securing *racial generalization*, or fundamental unity of inheritance, within each group, while between the groups there is prevention from free crossing. Reflexive selection, on the other hand, is applied to that kind of selection which may be described as depending on the relations of the members of a species to each other. Its most familiar forms are sexual selection and social selection. Now isolation is in its very nature the suspension not only of one form, but of all forms of reflexive selection between the separated portion of a species. Isolation as one of the four main factors of evolution, implies that the process of transformation is a very complex affair. We, on accepting isolation, recognize, by implication, in evolution the ultimate outcome of a number of factors, each of which has its own special efficacy, and each of which may also at times operate in a manner antagonistic to all of the others. This view, eclectic in its nature, is perhaps to be regarded as the most satisfactory explanation of the organic world and its upbuilding that has yet been put forward. But it must be repeated that it recognizes of the various factors thus engaged, the following four as the most potent and the most essential, and also as co-ordinate: The two Lamarckian factors, variation and inheritance, the Darwinian factor, natural selection, and the factor first postulated by Moritz Wagner, or isolation. Even Lamarck recognized that distinct organic types could not be maintained without some form of isolation, and such Neo-Lamarckians of to-day as Professor Packard have been even more emphatic in insisting on this principle as being among the essential conditions for any genuine divergent evolution. Charles Darwin used isolation as equivalent to geographical separation while later writers have come to use it as equivalent to independent generation. Isolation differs from selection in that the latter denotes the exclusion of certain kinds from opportunity to propagate, while the former denotes the division of those that propagate into classes that are prevented from intergenerating. Isolation, or the prevention of intergeneration, whether it be through separation or segregation is also called independent generation. Charles Darwin endeavored to explain the origin of species by the agency of natural selection plus the Lamarckian factors, variation and inheritance, and found in Wallace, Huxley and Haeckel, along with many other naturalists, ingenious supporters. On other sides, however, the specifically Darwinian explanation encountered vehement opposition. Moritz Wagner, for example, regarded free intercrossing as an insurmountable obstacle to the establishment of new modifications and contended very ably that the isolation of a few individuals, a condition which would occur most frequently during migrations, was a necessary postulate in accounting for the origin of each new variety or species. In these contentions Wagner showed the great value of migration and the intervention of geographical barriers in accounting for the process of speciation. The absence of interbreeding, as that resulting from geographical isolation,—what August Weisman calls *amixia*, —is substantially the prevention of free intercrossing, and thus a form of isolation. And Hugo de Vries, while his classical investigations resulted in the demonstration that it is possible to produce species, or true breeding forms, out of mutations by pedigree culture, still he failed to see that the essential factor is not the quality of the material he worked with (the mutations), but that it is the pedigree — culture, and that this corresponds to the well-known factors, selection and isolation. The importance of isolation as a co-ordinate factor with selection in the evolution of species is now gaining wide recognition. George J. Romanes insisted that "without isolation, or the prevention of free intercrossing, organic evolution is in no case possible." And he even went so far as to urge that isolation "has been the exclusive means of modification, or more correctly, the universal condition of it." But here it is to be remembered that Romanes failed to discriminate clearly between selection and isolation. It was the custom when he wrote to describe any influence that tends to transform species as a form of selection. For instance: Romanes says of infertility between varieties of the same species: "I will call this principle physiological selection or segregation of the fit." Since 1886 when Romanes wrote, however, isolation has by general consent come to mean the prevention of free-crossing between groups existing at the same time. (Rev. John T. Gulick). And in accordance with this usage even Romanes later substituted physiological isolation for physiological selection, which Seebohm suggests, as does Gulick also, is a better term. But when Romanes defined isolation itself he extended its meaning so as to include the prevention of crossing between those members of the group who succeed in living and propagating and those who die without propagating; a definition of, isolation which makes it include natural selection as one of its many forms. Modern nomenclature would however restrict the term selection to the influences that determine the survival, or continued propagation, of the fit innate variations of any given group, and the elimination, that is, the disappearance of the unfit, thus preventing the crossing of fit with unfit. And naturalists would likewise restrict isolation to the prevention of free-crossing between groups existing at the same time. And present day naturalists are also gradually coming to the conclusion that if natural selection works without isolation, only monotypic evolution can result. It is even evident that variation, inheritance, plus natural selection, working together, do not suffice for the interpretation of the whole process of evolution. They fail to account for the fact that often two or more different forms have originated from a single ancestral type. They are capable at best of explaining the transformation of one existing form into one other form. So it came about that the principle of isolation has found recent and able supporters in Baur, Ortman, Gulick and many others.

The mode of operation and the forms assumed in the operation of the principle of isolation, has made a classification of the various forms in which it manifests itself essential; and most of the remaining portion of this article will devote itself to the definition of these various manifestations of this prin-

ciple. Isolation itself has already been sufficiently defined. The principle immediately reveals two forms: (1) Autonomic isolation, which stands in contrast with heteronomic isolation, includes both endonomic isolation, produced by industrial, chronal and migrational isolation, and reflexive isolation, produced by sexual and social instincts, by impregnational incompatibilities, and by institutional requirements; (2) Heteronomic isolation, is that form of isolation determined by conditions outside of the organic group, for example, by geological subsidence, or other causes resulting in the transportation to an isolated position. In the four forms of environal isolation (see below), namely in transportational, geological, fertilizational and artificial isolation, heteronomic influences prevail. Treated from another point of view one may distinguish the following co-ordinate divisions of the principle of isolation: (a) Reflexive isolation, comprehending conjunctional, impregnational and institutional isolation (for which see below); (b) environal isolation, where the relations of the group and its environment are determined by conditions within the group. The importance of this form lies in the fact that it often opens the way for the entrance of more fundamental forms of segregation; (c) regressive isolation, or the amalgamation of races; (d) indiscriminate isolation, which results in the divergence in the aptitudes and innate characters of isolated groups, especially when at the time of the first setting apart, the group is represented by but one, or a few, individuals, and so producing initial racial segregation. It is usually attended with the loss of power to reproduce the average of the innate characters of the original stock.

Of the forms of reflexive isolation one may next distinguish: (1) Conjunctional isolation, which includes sexual and social isolation; (2) impregnational isolation due to the need of co-ordination between the size, structure, sexual elements and functions of each sex and the related characters of the other sex, in any intergenerating group; (3) institutional isolation, due to the differences of language, religion and education, a prevention to free association, will also prevent intermingling of races.

Of the forms of environal isolation may likewise be distinguished co-ordinate with the three foregoing: (1) Endonomic isolation, an example of which is presented, when varieties of the same species of plant occupying the same areas are prevented from crossing by flowering at different seasons, and among animals, when there occurs the cyclical isolation between the broods of the periodical cicada even when they succeed each other in the same district. And other forms of isolation so far as they are determined by the diversity of habits or instincts of the members of species, are forms of endonomic isolation; (2) herteronomic isolation, for which see above. It remains now to describe the following nearly co-ordinate sub-divisions of isolative influence.

The two forms of conjunctional isolation are (1) sexual isolation which arises between groups of the same species that have been separated by geographical barriers for several generations, and have in the meantime attained divergent forms of inherited characters by which they recognize each other, and also different methods of calling and winning each other; (2) social isolation which arises whenever two groups of a species have been separated by geography for many generations and in the meantime gain divergent social habits and instincts, rendering them unfit for being associated in one intergenerating group when brought together in one district. It is important to notice here that geographical isolation has ceased but the groups continue as separate groups through the influence of social isolation.

The eight forms of impregnational isolation are: (1) dimensional isolation, of which there is an example when local varieties of birds or of mammals that have become very divergent in size are brought together in the same district; (2) structural isolation, which arises when local varieties that have become so far divergent in structure as to be incompatible are brought together into the same district; (3) potential isolation, of which there are two forms: (a) Complete potential isolation which exists between types when their sexual elements are incapable of union in fertilized germs under any conditions; (b) Prepotential isolation which exists when cross-fertilization is possible if the alien fertilizing element has been applied sometime in advance; but which if the fertilizing element of the same species is applied at the same time, or in some cases, at any time during the several hours that follow, mixed fertilization is prevented by the prepotence of the pure fertilizing element; (4) segregate fecundity, the relation in which the species or the varieties stand to each other when intergeneration of members of the same species or varieties results in higher fertility than the crossing of different species or varieties; (5) segregate vigor, the relation in which species or varieties stand to each other when the intergeneration of members of the same species or variety produces offspring of more vigor than those produced by crossing with other species or varieties; (6) segregate adaptation, the relation in which species or varieties stand to each other when the intergeneration of individuals of the same species or variety produces offspring better adapted than the offspring produced by crossing with other species or varieties; (7) segregate freedom from competition, the segregate access to unused resources which results when the pure offspring have freer access to unused resources than do the cross-breeds or the original stock; (8) segregate escape from enemies arises whenever the pure offspring of a divergent variety are able to occupy a position freer from enemies than that occupied by the original stock.

The three forms of endonomic isolation are (1) industrial isolation, arising from the activities by which an organism protects itself against adverse influences in an environment, or by which it finds and then appropriates special resources in the environment; and having three forms: (a) Sustentational isolation, arising from the use of different methods of obtaining sustentation by members of the same species; (b) protectional isolation, or isolation from the use of different methods of

protection against adverse influence in the environment; (c) nidificational isolation, the prevention of free interbreeding between the different sections of a species by diversity of industrial habits,—the separation of the individual from the mass of the same species by an industrial habit; (2) chronal isolation, isolation arising from the relations in which an organism stands to times and seasons; it is of two kinds: (a) Cyclical isolation, arising from the fact that the life-cycles of the different sections of a species do not mature simultaneously; (b) Seasonal isolation, produced whenever the season for reproduction in any section of the species is such that it can not interbreed with other sections of the species; (3) migrational isolation, caused by the powers of locomotion in an organism.

The four forms of heteronomic isolation are; (1) transportational isolation, caused by the activities in the environment that distribute the organisms in different districts; (2) geological isolation, caused by geological changes which divide the territory occupied by a species into sections; (3) fertilizational isolation, a segregative rather than a separative form, in that it perpetuates a segregation previously produced, depending on divergence of character already clearly established, and therefore on some form of isolation that has preceded. The forms of isolation that precede fertilizational isolation are in the majority of cases local, but may be chronal or impregnational; (4) artificial isolation arising from the relations in which the organism stands after an attempt has been made to rationalize its environment.

Attention having been given to other features other groupings of these various sorts of isolation is possible. Thus potential isolation, segregate vigor and segregate fecundity might be brought together as forms of physiological isolation, in the sense in which Romanes uses the term in his work 'Darwin and after Darwin.' And thus, too, all forms of environal and regressive isolation, including as environal isolation does, all forms of endonomic and heteronomic isolation,—might not unreasonably be brought under a single caption as forms of coincident isolation. All these forms of isolation are talked about by naturalists who saw a necessity to specify the modes of operation manifest in the behavior of bionomic isolation, which, with three other principles, already spoken of, serves to explain the process of organic evolution.

Through such isolation the swamping or leveling effects of free intercrossing, or mixing with allied varieties or incipient species, are prevented. As a consequence, variations or nascent species become fixed or localized, being prevented from spreading by some geographic or topographic barrier, with the result that there are many thousands of local races, varieties and species; indeed, probably over half of the number of known species are such forms. Not only species, but genera and higher groups are thus isolated. Thus the marsupials of Australia are, with one or two exceptions, confined to that continent, the connection once existing with Asia having been cut off.

Examples of Isolation.—These are found among cave animals (q.v.) where animals confined to the nether world, living in total darkness, are prevented from breeding with their ancestors of the upper world. The deep-sea fauna is another such assemblage, living in gloom and in water at the freezing point, although at the surface the winter temperature of the sea may be 80–85° F. Other examples of the result of isolation are the assemblage of animals peculiar to certain islands, to basins walled in by mountain chains, valleys, deserts and Alpine summits. Interesting cases of isolation on islands are the gigantic moa birds of New Zealand; the local species of birds confined to the different islands of the Galapagos archipelago, also the land shells living in the different valleys of Oahu, one of the Hawaiian Islands.

Consult Dewar and Finn, 'The Making of a Species' (London 1909); Gulick, J. T., 'On Diversity of Evolution under One Set of External Conditions' (in Linnean Society of London, *Journal of zoölogy*, London 1872); id., 'Divergent Evolution and the Darwinian Theory' (in *American Journal of Science*, New Haven, January 1890); Hutton, F. W., 'Evolution: Racial and Habitudinal' (Washington 1905); Jordan, 'Isolation as a Factor in Organic Evolution' (in 'Fifty Years of Darwinism,' New York 1909).

ISOMERISM, ī'zō-mār'izm (Gr., "having equal parts"). Chemists formerly assumed that two bodies must be identical in chemical nature, in all respects, provided they consist of the same elements, combined in the same proportions. This view was long ago found to be untenable, and many substances (mostly compounds of carbon or nitrogen) are now known, which exhibit widely different properties, although possessing the same empirical formula. Bodies which possess this peculiarity are said to be "isomeric" with each other, and the property itself is called "isomerism." In its broadest sense, isomerism may be regarded as embracing (1) polymerism; (2) metamerism; (3) isomerism in the narrower sense; and (4) geometrical isomerism.

Bodies are "polymeric" when they have the same percentage composition, but have different molecular weights. Acetic acid, $C_2H_4O_2$, and grape sugar, $C_6H_{12}O_6$, for example, are polymeric with each other, because they consist of the same elements, combined in the same proportions, and yet the molecular weight of grape sugar is three times as great as that of acetic acid. In this particular case there is no specially close relation between the polymeric substances, and the polymerism is therefore said to be "accidental." When a close relation does exist between the bodies compared, the polymerism is said to be "generic." Ordinary acetic aldehyde affords a good example of generic polymerism. Aldehyde has the formula C_2H_4O, but when treated with a mineral acid it becomes transformed into paraldehyde, which has the formula $C_6H_{12}O_3$; and the reverse transformation (of paraldehyde into aldehyde) may be effected by the application of heat.

Compounds are said to be "metameric" when they have the same empirical formula, but differ structurally by containing different radicals, joined by a polyvalent element such as oxygen, nitrogen, or sulphur. Ethyl ether and propylmethyl ether, for example, both have the em-

pirical formula $C_4H_{10}O$; but ethyl ether contains two ethyl radicals, united by an oxygen atom, and propyl-methyl ether contains a propyl radical and a methyl radical united by oxygen in the same manner. Thus these two metameric bodies have the structural formulæ

$$\begin{matrix} C_2H_5 \\ C_2H_5 \end{matrix}\!\!>O \text{ and } \begin{matrix} C_3H_7 \\ CH_3 \end{matrix}\!\!>O, \text{ respectively.}$$

Metamerism is manifested, most commonly, by the ethers, esters and amines.

Isomerism in its narrower sense or "true isomerism," embraces those cases in which the bodies compared have the same empirical formulæ but have different structural formulæ and do not (like metameric bodies) consist of definite carbon radicals united by oxygen sulphur, or nitrogen. True isomerism may be of two kinds: (1) "nucleus isomerism," and (2) "isomerism of position." The hydrocarbons afford good examples of both kinds of true isomerism. The paraffin known as propane, for example, has the empirical formula C_3H_8, and the structural formula $CH_3—CH_2—CH_3$. Propane may be converted into butane by replacing one of its hydrogen atoms by the methyl radical, CH_3; but the substitution may be made in two essentially different ways, according as the hydrogen that is replaced is attached to the interior carbon atom, or to one of the terminal ones. In the latter case the structural formula of the new substance is $CH_3—CH_2—CH_2—CH_3$, and the substance itself is known as "normal" butane. If the hydrogen that is replaced is attached to the interior carbon atom, a different substance known as "isobutane" and having different properties from normal butane, is formed; its structural formula being

$$\begin{matrix} CH_3—CH—CH_3 \\ \quad\quad\quad | \\ \quad\quad\quad CH_3 \end{matrix}$$

These two substances,—normal butane and isobutane—are said to manifest "nucleus isomerism," since they differ by the mode of arrangement of their fundamental carbon chains. As the number of carbon atoms in a compound increases, the possibilities of nucleus isomerism becomes enormous. Thus the general empirical formula of the saturated fatty hydrocarbons (or paraffins) is C_nH_{2n+2}. We have seen that in the case of butane (for which $n=4$) two nuclear isomers are possible. If the same kind of reasoning is applied to the higher members of the series regarding each member as derived from the preceding one by the substitution of a methyl radical (CH_3) for a hydrogen atom, we shall find that there are 3 pentanes ($n=5$) possible: 5 hexanes ($n=6$); 9 heptanes ($n=7$); 18 octanes ($n=8$); 35 ennanes ($n=9$); 75 decanes ($n=10$); 159 hendecanes ($n=11$); 355 dodecanes ($n=12$); and no less than 802 tridecanes ($n=13$).

In that kind of true isomerism which is called "isomerism of position," the isomeric bodies contain substituted atoms or radicals, which occupy different positions in the main chain. Thus a paraffin may be converted into an alcohol by substituting a hydroxyl radical (OH) for one of the hydrogen atoms, and the resulting alcohol will have different properties according to the position of the hydrogen atom that was replaced. For example, four butane alcohols are possible. In normal butane, the structural formula of which is given above, the hydroxyl radical may be substituted for one of the terminal hydrogen atoms, in which case an alcohol is obtained which has the structural formula

$$CH_3—CH_2—CH_2—CH_2—OH$$

and is known as "normal primary butyl alcohol." If the hydroxyl is substituted in the place of one of the interior hydrogen atoms, an alcohol is obtained which has the structural formula

$$\begin{matrix} CH_3—CH—CH_2—CH_3 \\ \quad\quad | \\ \quad\quad OH \end{matrix}$$

and is known as "secondary butyl alcohol."

Proceeding, now to the consideration of isobutane, we note that two essentially different substitutions of the hydroxyl radical are here possible. We may replace a hydrogen atom in one of the three CH_3 groups, or we may replace the one in the CH group. In the first case the alcohol has the structural formula

$$\begin{matrix} CH_2—CH—CH_2—OH \\ \quad\quad | \\ \quad\quad CH_3 \end{matrix}$$

and is known as "isoprimary butyl alcohol"; and in the second case it has the structural formula

$$\begin{matrix} \quad\quad OH \\ \quad\quad | \\ CH_3—C—CH_3 \\ \quad\quad | \\ \quad\quad CH_3 \end{matrix}$$

and is known as "tertiary butyl alcohol." All of these four alcohols have been actually prepared. (For isomerism of position as manifested in the aromatic compounds, and for the nomenclature used in distinguishing the various isomers that those compounds can exhibit, see AROMATIC COMPOUNDS).

Certain compounds are known which possess not only the same empirical formula, but the same structural formula also, and yet manifest distinctly different properties either chemically or physically. Fumaric and maleic acids (see FUMARIC ACID) are examples of this. In such cases the provisional hypothesis is made, that the geometrical structures of the molecules of the two substances are related to one another in something like the same manner that the image of an object in a mirror is related to the object itself, and the isomerism is said to be "geometrical." See STEREO-CHEMISTRY.

With reference to isomerism in general, consult Hjelt, 'Principles of General Organic Chemistry'; Lothar, Meyer, 'Modern Theories of Chemistry.'

ISOMETRIC PERSPECTIVE, in mechanical drawing, a species of mechanical drawing in which three sides of an object are shown. Most mechanical structures can be referred to an including parallelopipedon. If a point be taken at or near the centre of a sheet of paper and three lines be drawn radiating therefrom, one vertical and downward, and two upward and oblique, making angles of 120° with each other they may be taken as representing three edges of a parallelopipedon. The object to be drawn is referred to this. Its vertical dimensions are laid off on lines parallel to the front vertical. Its horizontal members on one side are laid off parallel to one of the oblique lines, and the corresponding members on the other side parallel to the other oblique line. Thus

three faces of the object are seen. All dimensions parallel to the directing lines are on a true scale. Of the two side faces, the horizontal and vertical dimensions are given on a true scale, the diagonal dimensions being incorrect. It is a kind of false perspective that is easily drawn, and that has the great advantage of permitting the use of a true scale on certain controlling parts.

ISOMORPHISM, ī'sō-môr'fizm, signifying a similarity in form between things, is a term employed in (1) Crystallography, Mineralogy and in Chemistry; (2) Biology; (3) Mathematics.

In *crystallography, mineralogy and in chemistry,* "isomorphism" is a similarity of crystalline form between substances of analogous composition or atomic proportions. Sometimes the term is extended to mean similarity of crystalline form between substances of unlike composition or atomic proportions; but this sort of similarity should more properly be designated homoeomorphism. Used, however, in a double sense isomorphism proper is distinguished as isomerous or isonomic isomorphism; while homoeomorphism is distinguished as heteromerous or heteronomic isomorphism. Isomorphism, as a word, originated from the Greek *isos* (ἰόος), equal, and morphe (*μορφη*), "form," to which *ism* was suffixed according to laws of English analogy; thus iso[s]morph[e](-ous) + ism. In 1819 Eilhard Mitscherlich, a German investigator observed that compounds having the same number of atoms to the molecule are disposed to form the same angles of crystallization. This property he called isomorphism. This discovery of the coincidence of similarity in crystalline forms where the chemical-composition also is similar is a most important generalization for crystallography; in chemistry, it has been of essential service in facilitating the classification of compounds and in determining the combining numbers or atomic weights in elementary bodies. Carbonates, oxides, silicates, etc. all present close similarity in the arrangement of their molecules, a fact known from their crystallization, cleavage, and optic properties. And they all, likewise are so related by chemical composition as to form part of one and the same mineralogic division. Minerals so related form an isomorphous group; they illustrate isomorphism. The diamond, magnetic oxide of iron, and alum, all crystallize in octohedra; but there is no analogy in their chemical composition; thus they present only one of the conditions of chemical isomorphism. They are heteronomic; and illustrate homoeomorphism.

Mitscherlich long ago tried to show that crystalline form is independent of the chemical nature of the atoms, and that it is determined solely by their groupings and relative position; the same number of atoms combined in the same way always producing, he asserts, the same crystalline form.

Isomorphous bodies can form homogeneous mixed crystals; and each one is capable of growing in a saturated solution of the other, fresh crystals being gradually amassed around the original body as a nucleus. The presence of the same chemical elements of composition in substances does by no means imply isomorphism and substances of very varying components may yet be isomorphous. The isomorphous elements in isomorphous salts, as, for instance, the metals, are generally of the same or related groups of elements. In some instances a combination of elements occurs crystallized in two or more series of crystal forms which are notably separate and distinct and frequently present the symmetry of different systems. This gives rise to two (sometimes three) species of identical chemical composition and is known as dimorphism (or trimorphism where three species are concerned). Carbonate of calcium, which crystallizes in orthorhombic forms as the mineral aragonite and in the hexagonal system as the mineral calcite, presents an excellent example of dimorphism. Yet both aragonite and calcite stand at the head of isomorphous groups of carbonates, also. To illustrate this:

Carbonates of calcium, known as calcite, magnesite or magnesium, siderite or iron, rhodochrosite or manganese, smithsonite or zinc, respectively symbolized as $CaCO_3$, $MgCO_3$, $FeCO_3$, $MnCO_3$ and $ZnCO_3$, form together an isomorphous group. All crystallize in the rhombohedral system, and with nearly the same angles, — the angles of cleavage in rhombohedra, varying from 105 to 107½. Between the members of an isomorphous group "intermediate compounds" may occur, regarded as isomorphous mixtures of two unlike molecules. Thus dolomite, the carbonate of calcium, and magnesium may be considered as formed by the union of the calcium carbonate molecules with those of magnesium carbonate.

Isodimorphism is isomorphism between the two forms, severally, of two dimorphous substances. Isothrimorphism is isomorphism between the three forms, severally, of two isotrimorphous substances. (See CRYSTALLOGRAPHY). For further study consult Dana, J. D., 'System of Minerology' (New Haven 1837 and later editions); Moh, F., 'Grundriss der Mineralogie' (Dresden, n.d.); Naumann, C. F., 'Lehrbach der Krystallographie' (Leipzig, n.d.); Goldschmidt, V., 'Index der Krystallformen der Mineralien' (Berlin, n.d.); Whitlock, H. P., 'Critical Discussion of the Crystal Forms of Calcite' (in Proceedings of the American Academy of Arts and Sciences, Vol. I, No. 12, August 1915).

Isomorphism in biology is a similarity in organisms of different ancestry. The similarity here results from convergence, or the development or possession of similar characters by animals or plants, explained as due to similarity in habits, or in environment. Consult Darwin, 'Origin of Species,' on "convergence."

Isomorphism in mathematics is the Theory of Groups, the quality of groups rendering them similar in form, or isomorphic.

ISOPODA, ī-sŏp'ō-da, an extensive and varied group of *Crustacea* (q.v.) usually ranked as a suborder of the *Arthrostraca* or sessile-eyed *Malacostraca.* The body is broad and flattened, and either short or elongated; the carapace is absent or little developed; the thorax long with seven free segments, each bearing a pair of walking limbs; the abdomen more or less shortened and bearing lamellar branchial appendages. The *Isopoda* are classified in several tribes and more than 30 families, embracing an enormous number of species. They vary greatly in form and mode of life but

all are of relatively small size and retiring habits. The vast majority are marine, but a few are inhabitants of fresh water or terrestrial; the latter are familiar to everyone under the names wood-lice and pill-bugs. Most of the marine forms live a free life but conceal themselves in crevices or among sessile animals and plants, others bore into wood, some, as the gribble and its allies, being destructive to piling; many are commensal or parasitic, among the latter being the *Cymothoidæ*, which infest fishes and whales, and the greatly degenerated *Bopyridæ*, which live in the branchial chamber of prawns and similar crustaceans. Consult Packard, 'Zoology' (1887); Leichmann, Georg, 'Beiträge zur Naturgeschichte der Isopoden' (Cassel 1891); Richardson, H., 'Key to Isopods of North America' (in Proceedings United States National Museum, Vols. XXI and XXIII, 1899, 1901); Id., 'Isopods Collected at Hawaiian Islands by United States Steamer Albatross' (Washington 1903); id., 'Contribution to the Natural History of the Isopoda' (ib., 1904); id., 'Monograph on the Isopoda of North America' (ib., 1905); id., 'Isopods Collected in the Northwest Pacific' (ib., 1906).

ISOSPONDYLI, ī-sō-pŏn'dĭ-lī. See ICHTHYOLOGY.

ISOSTASY, ī'sŏs-tą'sē. The word isostasy expresses an idea which has been developing gradually in definiteness for a century.

Pratt, an English geodesist, reached the conclusion early in the 19th century that the deflections of the vertical apparently produced by the Himalayas are much smaller than they would be if those mountains and the material beneath them were of the same average density as the material beneath the plains of India. Pratt's reasoning was based entirely upon the well established law of gravitation, namely, that the attraction between any two small portions of matter is proportional to the product of their masses and inversely proportional to the square of the distance between them. He computed roughly the attraction, due to the mass of the Himalayas, which would act upon a plumb bob hung at various points over the plains of India and computed the deflection of the plumb line which would be produced by this nearly horizontal attraction tending to pull the bob toward the mountains. The deflections of the plumb line as observed at these points by geodetic methods were much smaller than the deflections which Pratt thus computed. He offered the possible explanation that the material underlying the mountains is of smaller average density than that underlying the plains, or, in other words, that the excess of mass visible in the mountains is compensated by a defect of density, and therefore of mass, in the material below the mountains. This was the beginning of the idea now called isostasy.

Many years later various American geologists noted, as they believed, a prevailing tendency for large portions of the earth's crust to rise as load was removed from the surface by erosion, or to subside as load was added by deposition. They reasoned that such a sensitiveness to change of load indicates that there is a close approach to equality in the total load under the various equal areas of the earth's surface. Their idea may be roughly expressed by saying that the total weight of any conical mass of matter having the earth's centre for its apex, and any one square mile of the earth's surface as its base, is nearly the same as that of any other similar conical mass having some other square mile for its base.

Maj. C. E. Dutton, in an address before the Philosophical Society of Washington in 1889, coined the word isostasy, and then and there presented the idea which the word represents so clearly and marshalled the evidence in favor of the validity of the idea so skillfully as to attract general attention. From that day to the present the discussion of the idea and of its numerous important relations to geology and geodesy has been continuous and increasing in vigor.

From about 1898 to date (1918) the geodetic evidence that the condition called isostasy exists has been steadily gathered in a continuous investigation by the United States Coast and Geodetic Survey,—an investigation which is more vigorous in this line than that carried on in any other country. Two methods are used in that organization. The first is a refinement and extension of the method used by Pratt which has already been mentioned. The other method of observation consists in measuring with great accuracy the acceleration due to gravity at various points on the earth's surface by swinging invariable pendulums. It is evident that if the material under the observing station is of very low density the gravitational force acting on the pendulum bob will be smaller, and it will swing slower, than it would if the material were of normal density. Similarly over material of high density the pendulum will swing faster than over material of normal density. By properly refined methods of observation and computation the pendulum serves to indicate variations in density of the material underlying the region of observation. Geodesists in various countries have been especially active since about 1906 in developing the evidence in regard to isostasy.

An approximate definition of isostasy is indicated by the historical statement already made An exact definition is given in the few paragraphs which immediately follow this.

If the earth were composed of homogeneous material, its figure of equilibrium, under the influence of gravity and its own rotation, would be an ellipsoid of revolution.

The earth is composed of heterogeneous material which varies considerably in density. If this heterogeneous material were so arranged that its density at any point depended simply upon the depth of that point below the surface, or, more accurately, if all the material lying at each equipotential surface (rotation considered) was of one density, a state of equilibrium would exist and there would be no tendency toward a rearrangement of masses. The figure of the earth in this case would be a very close approximation to an ellipsoid of revolution.

If the heterogeneous material composing the earth were not arranged in this manner at the outset, the stresses produced by gravity would tend to bring about such an arrangement. But as the material is not a perfect fluid, as it possesses considerable viscosity, at least near the surface, the rearrangement will be imperfect. In the partial rearrangement some stresses will still remain, different portions of

the same horizontal stratum may have somewhat different densities, and the actual surface of the earth will be a slight departure from the ellipsoid of revolution in the sense that above each region of deficient density there will be a bulge or bump on the ellipsoid, and above each region of excessive density there will be a hollow, relatively speaking. The bumps on this supposed earth will be the mountains, the plateaus, the continents; and the hollows will be the ocean. The excess of material represented by that portion of the continent which is above sea level will be compensated for by a defect of density in the underlying material. The continents will be floated, so to speak, because they are composed of relatively light material; and, similarly, the floor of the ocean, will, on this supposed earth, be depressed because it is composed of unusually dense material. This particular condition of approximate equilibrium has been given the name isostasy.

The compensation of the excess of matter at the surface (continents) by the defect of density below, and of surface defect of matter (oceans) by excess of density below, may be called the isostatic compensation.

Let the depth within which the isostatic compensation is complete be called the depth of compensation. At and below this depth the condition as to stress of any element of mass is isostatic; that is, any element of mass is subject to equal pressures from all directions as if it were a portion of a perfect fluid. Above this depth, on the other hand, each element of mass is subject in general to different pressures in different directions — to stresses which tend to distort it and to move it.

In terms of masses, densities and volumes, the conditions above the depth of compensation may be expressed as follows: The mass in any prismatic column which has for its base a unit area of the horizontal surface which lies at the depth of compensation, for its edges vertical lines (lines of gravity) and for its upper limit the actual irregular surface of the earth (or the sea surface if the area in question is beneath the ocean) is the same as the mass in any other similar prismatic column having any other unit area of the same surface for its base. To make the illustration concrete, if the depth of compensation is 76 miles below sea level, any column extending down to this depth below sea level and having one square mile for its base has the same mass as any other such column. One such column, located under a mountainous region, may be two miles longer than another located under the seacoast. On the other hand, the solid portion of such a column under one of the deep parts of the ocean may be three miles shorter than the column at the coast. Yet, if isostatic compensation is complete at the depth of 76 miles, all three of these columns have the same mass. The water above the suboceanic column is understood to be included in this mass. The masses being equal and the lengths of the columns different, it follows that the mean density of the column beneath the mountainous region is two parts in 76 less than the mean density of the column under the seacoast. So, also, the mean density of the solid portion of the suboceanic column must be greater than the mean density of the seacoast column, the excess being somewhat less than three parts in 76 on account of the sea water being virtually a part of the column.

This relation of the masses in various columns, and consequently of the densities, follows from the requirement of the definition of the expression "depth of compensation" that, at that depth, each element of mass is subject to equal pressures from all directions. In order that this may be true the vertical pressures, due to gravity, on the various units of area at that depth must be the same.

The geodetic evidence now available proves that the condition called isostasy exists in the earth. It is certain that there is isostatic compensation for continents as a whole, and for their larger features, and that the compensation is a fair approximation to being complete and perfect. In the same way there is isostatic compensation for the ocean basins.

The evidence indicates that the depths within the earth at which the isostatic compensation is approximately complete and at which, therefore, each element of the mass is subject to equal pressure from all directions, is about 76 miles (122 kilometers). There are great inherent difficulties in determining this depth with accuracy. It is certain, however, that the depth of compensation is much less than the radius of the earth. Seventy-six miles is less than one-fiftieth of the radius. In other words, it is certain that isostatic compensation may properly be considered as a surface condition of the earth, rather than an interior condition.

It has already been indicated in this article how the geodesist and the geologist each reached the idea of isostasy. In the paragraphs defining the word isostasy it has been indirectly suggested that the physicists might independently have reached the idea if they had considered with sufficient care the tendency to rearrangement of the material within an earth composed of heterogeneous material which is neither perfectly fluid nor absolutely rigid.

A fourth point of view, stated below, which may be called the engineering point of view, also leads inevitably to the conclusion that there must be some isostatic compensation beneath the earth's surface. Consider the continents and great mountain ranges to be loads on the earth's surface in the sense that a railroad embankment across a plain is an added load, and consider the great ocean basins to be excavations, or negative loads comparable to canals or railroad cuts. On this basis compute the strength which the material composing the earth must have in order that the irregular surface of the earth may be maintained unchanged. It then becomes evident that the necessary strength is far in excess of that possessed by the materials of which the earth is made. Under the condition stated, that is without isostatic compensation, even if the whole earth were made of the strongest granite known, the continents must necessarily slump down into the oceanic basins and partially fill them. With approximate isostatic compensation the condition is one of approximate equilibrium, and the maximum stresses within the earth material are demonstrably within maximum limits which are not far from the known limits of strength of the materials accessible at the earth's surface. Thus from an engineering point of view

isostasy furnishes an explanation of the observed semi-permanence of continents and oceanic basins.

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ISQUARD, Niccolò, Italian composer: b. Malta 1775; d. 1818. He was destined for the navy by his parents, but preferred a commercial life which he followed for a short time. Going to Paris he studied under Pin. He subsequently studied in Malta and Italy under various masters. At the age of 20 he brought out his opera 'L'Avviso ai maritati.' Soon afterward he became chapel-master to the Knights of Saint John of Malta. He went to Paris about 1800 and there in 1802 appeared his great success, 'Michel Ange.' He was engaged as writer by the Opéra Comique, in which relation he remained until piqued by Boieldien's popularity he abandoned himself to a career of dissipation which within a year resulted in his death from phthisis. In all he wrote 33 operas, the best known of which are 'Le médecin turc' (1803); 'L'Intrigue aux fenêtres' (1805); 'Le siège de Mezières' (1814), and 'Aladin, ou la lampe merveilleuse,' left unfinished at his death.

ISPAHAN, ĭs-pȧ-hän', or **ISFAHAN,** Persia, city and former capital, 210 miles south of Teheran, in the midst of an extensive plain watered by the broad river Zendeh, here crossed by five bridges. In the time of Chardin (q.v.), from 1664 to 1681, the walls were 24 miles in circuit, and contained 162 mosques, 48 colleges, 1,802 caravansaries and 273 public baths, and the population was then estimated at 600,000. A great part of the city is at present a mass of ruins. Under the caliphs of Bagdad it became the capital of the province of Irak. Situated in the centre of the empire, and surrounded by the most fertile territories, it soon became a place of great population, wealth and trade. In 1387 it was taken by Tamerlane and the citizens were given up to indiscriminate massacre; 70,000 are said to have perished. In 1722 it was taken by the Afghans, when the capital was removed to Teheran; but in 1727 it was retaken by Nadir Shah, since which it has not been a royal residence. The great palace built by Shah Abbas is said to have been five miles in circuit, a great part of which space, however, was laid out in 10 gardens, adorned with summer houses. The square called Maidan Shah was one-third of a mile in length, and was formerly encircled by a canal bordered with plane-trees. The principal buildings still standing are the Chehel Sutun or Hall of Many Columns, the palace of Hasht Behest or Eight Paradises, two mosques and the 18th century medresseh (school) and caravansary. The streets are narrow, winding, irregular, unpaved and very dusty. When Ispahan was in its prosperity its suburbs were distinguished for their extent and beauty. The manufactures of the city are still extensive, including trinkets, fire-arms, sword-blades, glass and earthenware. The textile fabrics range from the most expensive velvet and satin to the coarsest nankeen and calico. The present population is about 75,000.

ISRAELITES. See JEWS AND JUDAISM.

ISRAELS, Joseph, Dutch painter: b. Groningen, 27 June 1824; d. 1911. He was a pupil at Amsterdam of Kruseman and at Paris of Picot, and established his studios first at Amsterdam and later at The Hague. Having essayed historical painting with no marked success, he turned his attention to genre work. He found his subjects among fisher folk and the humbler classes, whose existence, particularly in its more serious or tragic phases, he depicts in a style likened to that of Millet. Very many of his pictures are in the United States and he is well represented in all continental galleries. The Metropolitan Museum, New York, has his 'Expectation,' 'A Frugal Meal,' 'A Dutch Interior' is in the Walters Collection, Baltimore. Other works are 'The Cradle,' 'Katwijk Orphan Asylum' (1867); 'The Silent House'; 'Alone in the World'; 'A Son of God's People'; 'Before Parting'; 'David before Saul'; 'Children of the Sea'; 'When One Grows Old'; 'The Jewish Scribe'; 'A Shipwrecked Mariner'; 'The Zandvoort Fisherman'; 'Toilers of the Sea,' perhaps his greatest work; 'The Bric-à-Brac Dealer.' He published 'Spanien, eine Reiseerzählung' (1900). Consult Dake, C. L., 'Josef Israëls' (Berlin 1910) and Liebermann, Max, 'Josef Israëls' (2d ed., Berlin 1902).

ISSACHAR, the ninth son of Jacob, and the fifth by his mother Leah; also the name of the tribe of Israel descended from him. The tribal territory was south of that of Zebulun, Naphtali, Asher and Dan, in the plain of Esdraelon. See ISRAELITES.

ISSOUDUN, France, town and capital of an arrondissement in the department of Indre, on the Théolle, 20 miles southwest of Bourges. It contains a college, museum and library and has manufactories of machinery and textiles, parchment, beer, brushes, etc. The town is very ancient, but there are little or no historical remains. Pop. 10,200.

ISSUE, *in law,* the descendants of a common ancestor, or in pleading, a point affirmed by one party in a suit and denied by the other. In the latter sense an *actual* issue is one formed in an action regularly brought to try a question of right; a *collateral* issue is one formed in a matter only indirectly in the line of the pleading; *a feigned* issue is one formed in a fictitious action, under authority of a court, to try a question of fact before a jury; a *formal* issue is one formed according to the rules required by law; a *general* issue denies the whole declaration in direct terms; an *immaterial* issue is formed on some nonessential matter which will not determine the merits of the cause; an *informal* issue arises when a material allegation is improperly traversed; a *material* issue determines the merits of the cause when decided; a *special* issue is a single point selected by the defendant on which he rests his whole cause; a *common* issue is one formed on the plea of *non est factum* to an action of covenant broken.

ISSY, a suburb of Paris, situated on the left of the Seine less than two miles above Paris, in the department of the Seine. It contains a castle, a museum, a Sulpician seminary and an asylum for the aged. Chemicals, paints, oils, cement, shoes and silk are manufactured.

The town suffered greatly during the siege of 1870-71. Pop. 20,000.

ISTEL, Edgar, German musician and author: b. Mainz, 1880. He was educated at the Gymnasium of Mainz and studied music under Volbach. He removed to Munich in 1898, and there studied at the university, meanwhile pursuing his musical studies under Thuille. He is the author of the operas 'Der fahrende Schüler' (1906); 'Des Tribunals Gebot' (1914), and several choruses, songs, etc. His literary works are 'Peter Cornelius' (1906); 'Die Entstehung des deutschen Melodramas' (1906); 'Die komische Oper' (1906); 'Das Kunstwerk Richard Wagners' (1909); 'Das Libretto' (1914).

ISTHMIAN (ĭs'mĭ-ăn) **CANALS.** See NICARAGUA CANAL; PANAMA CANAL.

ISTHMIAN GAMES, so called because they were celebrated on the Isthmus of Corinth. Here was a famous temple consecrated to Poseidon, near which the Isthmian games were celebrated. On one side of the temple were the statues of the victors in these games and on the other was a grove of pines. In the temple stood four horses, gilded all over, with the exception of their ivory hoofs; by the side of the horses were two Tritons, the upper parts of which were gilt and the rest of ivory. Behind the horses was a car, with the statues of Poseidon and Amphitrite, of gold and ivory. Not far from the temple were a considerable theatre, and the stadium, of white stone, in which the games were celebrated. The whole isthmus was sacred to Poseidon, who was thence called *Isthmius*. According to the common opinion the Isthmian games were founded in honor of Palæmon or Melicertes, by Sisyphus, king of Corinth. When there was war between the states of Corinth and Athens a sacred truce was concluded, and the Athenians were solemnly united to attend the celebration of the games. They were celebrated with the same splendor as the Olympian and other public games, in the first and third years of each Olympiad, probably in autumn; the athletic exercises were the same. The victors were at first adorned with wreaths of pine-leaves, but afterward with wreaths of dry and faded ivy. The pine wreaths were afterward resumed. Victory shed a lustre not only over the individual, but over his family and the community to which he belonged. See GREEK FESTIVALS.

ISTHMUS, a neck of land uniting two larger portions or uniting a peninsula to the mainland. By the ancient Greeks the word was often used alone, without any additional word, to designate the Isthmus of Corinth, just as in America one hears frequently the term so applied to the Isthmus of Panama. The Isthmian games were celebrated on the Isthmus of Corinth. See GREEK FESTIVALS.

ISTHMUS OF PANAMA. See PANAMA, ISTHMUS OF.

ISTIB, or **SHTIPLIE,** Serbia, town in the southeastern part of the kingdom, 110 miles south of Nish. It contains several mosques. Until 1912 it belonged to the Turks, but in that year it was captured by the Serbians and was fully ceded to them by the Treaty of Bucharest the year following. It has a large trade. Pop. about 13,000, of varied types and nationalities.

ISTLE, ĭs'tl, or **TAMPICO,** a structural fibre produced from several species of small Mexican agaves, chiefly *Agave Lecheguilla*. The plants grow wild over a wide area from western Texas to New Mexico and southward. Centres of the fibre industry are located in the states of Coahuila, Tamaulipas, Nuevo Leon and San Luis Potosi. About 10,000 tons worth about $650,000 is imported into the United States annually. In Mexico it is used for rough cordage, saddle girths and sacks. It is derived from the cogolla, or central spike of unopened leaves, these being separated by hand and each leaf scraped on both sides with a dull edged knife to release the fibre, which lies just under the epidermis. The yellowish white filaments are harsh, stiff, but smooth. After drying, the fibre is put up in bundles of about 75 pounds and transported by pack animals to the neighboring towns, where it is sorted, baled and sent by rail to Tampico for shipment, hence the commercial name "Tampico." See CORDAGE; CORDAGE INDUSTRIES; FIBRE; MEXICO.

ISTRIA, former Austrian margraviate, which until 1918, with the county of Görz and Gradiska, and the town and territory of Trieste, formed the crownland of Küstenland. It consists of a peninsula projecting into the northeast corner of the Adriatic Sea, together with the adjacent Quarnero Islands. It has an area of 1,908 square miles. The surface is mountainous with off-shoots from the Julian Alps. Two-thirds of the people are of Slavic race and about one-third Italian. Istria was originally inhabited by a tribe of Illyrian pirates and resisted the Roman arms till 177 B.C. After the fall of the Western Empire it formed part of various kingdoms till Austria acquired it in 1797. In 1805 Austria was forced to yield it to France; but retook it in 1813, and held it until the debâcle of October 1918 when Allied troops occupied Pola. Pop. 403,260.

ISVOLSKY, ĭs'vôl-skē, **Alexander Petrovitch,** Russian statesman: b. Moscow, 18 March 1856. At the age of 22 he was sent on a mission to Pope Leo XIII, from which later resulted the establishment of a Russian legation at the Vatican. After passing through a succession of minor offices he was appointed Ambassador to Japan in 1900 and to Denmark in 1902. In Tokio he exerted himself to heal the grievance still rankling in Japan against Russia over the treaty of Shimonoseki. During Count Witte's tour of inspection over the Manchurian Railway in 1901, Isvolsky endeavored to induce him to make the short journey from Dalny and visit Japan. This Witte refused to do, notwithstanding that the Japanese government had decided — in the event of such visit — to receive the Russian Finance Minister with the honors accorded to royal personages. Within less than three years Russia and Japan were at war. In May 1906 Isvolsky succeeded Count Lamsdorff as Foreign Minister. The Austrian annexation of Bosnia-Herzegovina in 1908 aroused his strongest protests against the proceedings of Count Aehrenthal (q.v.); in the diplomatic crisis that followed, the intervention of Germany in 1909 forced Isvolsky to withdraw from his position and accept the annexation as a *fait accompli*. His prestige had suffered a defeat;

he retired from the Foreign Office in September 1910 and in the following month succeeded M. Nelidoff as Ambassador to France. He resigned in June 1917 and settled in Biarritz. A brilliant scholar and linguist, he is described as a man of impetuous character with a fondness for unraveling complicated situations. To his credit must be placed the Anglo-Russian Agreement of 1907 and the Russo-Japanese Agreement of 1910.

ITACOLUMITE, ĭ-ta-kōl'ū-mīt, also known as flexible sandstone, is a mineral curiosity. It is a light colored, laminated-granular schistose quartzite containing besides quartz grains, mica, talc and chlorite. Usually thin bedded, pieces an inch thick or more have considerable flexibility. It derives its name from the Brazilian mountain Itacolumi. It is found in Brazil where it is usually associated with diamonds.

ITAGAKI, Taisuke, tī-soo'kā ē-tā-gā'kē, COUNT, Japanese statesman: b. Tosa province, island of Shikoku, 1837. He received a military education, and in the War of the Restoration (1868) was prominent in the imperial army. From 1871 until his resignation in 1873 he was a privy councillor to the emperor. He then became the centre of a movement for constitutional government which in 1877 addressed to the government a memorial asking for a representative assembly and broaching popular rights. Itagaki aimed at a system based on that of Great Britain or the United States, as opposed to the system based on that of Germany, drafted by the Marquis Ito and promulgated in 1890. But he would have been satisfied at first, it is said, with an assembly which quite excluded the popular element. He organized the *Jiyuto,* or Liberals, the first Japanese political party, which rapidly increased in numbers. In 1878 he became Minister of Public Works, in 1880 Minister of the Interior, and in 1898 the Liberals united with the Progressists, led by Count Okuma, to form the so-called Constitutional party, which had a large majority in the lower House of Parliament. At the Mikado's request Itagaki and Okuma formed a cabinet, with Itagaki as Minister of the Interior. The cabinet resigned after six months, and the Constitutional party was separated into its original parts. In 1887 he was made a count. Itagaki was not only the founder of the first political party in Japan, but the most steadfast propagandist for political freedom and a liberal constitutional government in Japan. In 1882 an unsuccessful attempt was made to assassinate him, and although severely wounded, his remark "Itagaki may die but liberty will live" became an inspiriting rallying cry. A bronze statue representing the count in modern attire was unveiled to his memory at Gifu in 1918. (See JAPAN). Consult Fitzgerald, W. G., 'Some Japanese Statesmen of To-day' (in *Putnam's Magazine,* Vol. III, p. 405, New York 1908).

ITALA, Latin versions of the Bible current in Italy previous to the Vulgate of Saint Jerome. (See BIBLE). Consult Schanz, 'Geschichte der römischen Litteratur' (2d ed., Munich 1905).

ITALIAN ARCHITECTURE. See ARCHITECTURE.

ITALIAN FURNITURE. See FURNITURE, MEDIÆVAL.

ITALIAN SOMALILAND, the colony and protectorates of Italy in Somaliland (q.v.). They extend along the eastern coast of Africa, from British Somaliland (q.v.) to the course of the Juba. They cover an area of 139,430 square miles. The protectorates comprise North Somaliland; the territory of the Nogal from Cape Gabbel to Cape Garad; the Sultanate of Obbia; and the "Somalia Italiania Meridionale," formerly called Benadir. The principal towns are Mogadisho, pop. (13,000); Brava, (8,000); Mahaddei (5,000); Baidoa (2,000). The government is in the hands of a civil governor, whose headquarters are at Mogadisho. The principal occupations are cattle-raising and agriculture. The country exports ivory, cotton, gum and cattle products. Steamers connect the colony with Italy. The boundaries were determined by treaty with the natives between Italy and Abyssinia in 1908, and the Anglo-Abssynian frontier was established in 1897. There are wireless telegraph stations at the principal coast and inland towns which are in communication with Italy. Pop. about 450,000.

ITALIAN TAPESTRY. See TAPESTRIES.

ITALIC LANGUAGES, a group of languages supposed to have been at an early date in their history, confined to Italy, and the group of languages developed out of these. It is usual to divide the Italic languages into two sub-groups, generally designated as the Latin-Faliscan and the Oscan-Umbrian, both of which belong to the Indo-European or Aryan (Indo-Germanic) family of languages. To a very considerable extent most of these tongues have acted and reacted upon one another in recent times, within the boundaries of their original habitat in the regions to which they were subsequently extended. The two great groups already mentioned seem also to have been influenced or modified by more aboriginal languages that preceded them in the Italian territory. There is very much uncertainty still existing with respect to this very early period of the Italic languages, which belongs to the years following the time when their possessors first made their way into the Italic peninsula. But though much relating to this early period is left in obscurity, yet enough has been drawn out of the shadow of the past to show the relationship of the various Italic dialects to one another.

Not only were the two great groups of Italic tongues apparently modified by the languages existing in the country when they first entered it, but they were again subject to modifications caused by influences exercised from without. So great was the introduction of Greek words at a certain period in the growth of the Italic languages that earlier philologists were led thereby to look upon Greek and Latin as very closely allied tongues, a conclusion not sustained by more recent investigations.

Throughout what is modern Italy there were, at the beginning of the earliest historical records of the country, various dialects. Two of these, approaching one another, formed the great Italic sub-division, Oscan-Umbrian. The Oscan tongue included the Samnite tribes, the Campania country and southern portion of the Italic peninsula, with the exception of the ex-

treme south. The Umbrian tongue covered the greater part of the north and centre of Italy. The latter, though including a comparatively large extent of the isthmus, was much more homogeneous and much less dialectically inclined than the other local tongues of Italy. The Oscan-Umbrian group of Italic languages consisted of eight distinct dialects: the Oscan, Paelignian, Marrucinian, Marsian, Æquian, Sabine, Volscian and Umbrian in the 4th century B.C. All these dialects, though differing considerably from one another, differed still more notably from the tongue of Classical Latin, which gradually came to dominate, in the course of time, all the other tongues of central Italy, and extended its influence well toward the north and the south. The evidence, however, does not go to show that Classical Latin ever became the speech of the masses of the inhabitants of Italy to the south or the north though the literary tongue was everywhere the speech of the educated, especially when treating with the Roman officials or having intercourse with Roman society.

Latin-Faliscan.— This group of Italic languages is usually credited with being the mother of the Romance tongues. To a very great extent this is true yet there seems to be no doubt that all the dialects of Italy, every one of which furnished soldiers for the Roman army, contributed some part to the upbuilding of the Romance languages which became heirs to the Latin official tongue throughout the Roman Empire. Yet the influence of the Oscan-Umbrian dialects was probably greater on the popular speech of Italy in Roman days than upon the subsequent speech of any of the Roman provinces. In Italy, however, the result was quite different; for here the dialects remained the speech of the masses of the people long after Rome had become a great city and the centre of an extending empire; and so strong was their virility that they imposed many of their own tribal words on literary Latin, while hundreds of others passed current in the daily speech of the imperial city, where this vernacular became early known as Italian to distinguish it from Classical Latin. But to this popular tongue the dialects of Latin-Faliscan contributed very much more copiously than did those of the Oscan-Umbrian group. This was quite natural because the four sub-divisions of the Latin-Faliscan group (Latin, Lanuvian, Prænestine and Faliscan) were much more closely related to one another than to the Oscan-Umbrian dialects. Latin gradually absorbed the other three members of its own group, which may be said therefore to have dropped completely out of the linguistic theatre (except in so far as their influence on the popular Latin tongue is concerned) before the Romance languages began to differentiate themselves from Classical Latin, which had become the single representative of its group, and of Roman dominion, culture, organization and government. For this reason it has been called the mother of the Romance tongues, for out of it all of them have sprung. The Oscan-Umbrian group of Italic dialects, on the other hand, did not altogether disappear in many districts; and even to-day their influence is seen in numerous localities in the rural speech, more especially in the mountainous regions of the north. This influence extends very little beyond the borders of modern Italy, however, and that only in the one direction already indicated, the mountainous country to the north, and perhaps parts of eastern France and Spain.

Latin Tongues.— When the Roman Empire broke up it left its various domains in possession of the Latin tongue, modified greatly it is true, in the popular speech in different districts by all-compelling local conditions, yet still essentially Latin in its vocabulary, idiomatic expressions and grammatical structure. Out of this inheritance of the Latin language sprang a whole family of new tongues which are now known as the Romance languages. These differ very considerably from one another; yet their general Latin characteristics are so strong that the mastery of one Romance tongue is the key to the facile acquirement of all the others. The term Romance is expressive of the close relationship of these languages to one another. The Latin language was primarily the language of Rome. But, as we have seen, the language of the Roman Empire, in so far as the vast body of the people constituting its populace was concerned, had been enriched and materially strengthened by an extensive vocabulary borrowed from all the dialects of the Latin-Faliscan group of Italic languages. During the Middle Ages the name Romania was applied to the Roman Empire, and its speech was called the Roman tongue, a term used sometimes to designate Classical Latin, and, at others, to signify the more popular and somewhat corrupted speech of the Roman populace, more especially in Gaul. A knowledge, therefore, of the relation of the various members of the modern Latin or Romance group of languages to one another, demands complete familiarity with the origin, growth and external and internal influences brought to bear on each member of the group from the earliest days of the contact of Latin and aboriginal cultures in the region bounding each of the other members of this sub-group of closely related tongues. This Romanic tongue welded into a more or less homogeneous mass in the city of Rome itself, had become the speech of the masses of the Imperial city and gradually that of the Roman army and of the colonies. Thus there was, from the very beginning of the Roman colonial policy, some difference between Classical Latin and popular Latin. Already there had begun the disregard of unaccented syllables and the contraction of the longer and more sonorous words of the classical tongues. This process of contraction continued and extended to the inflection of Latin itself. The disappearance of most of the latter called for a pronounced analytical construction which found its most rigid form in French.

All these changes were encouraged, hastened and intensified by the influences brought to bear on the Roman or popular tongue after it began to extend from Italy into the surrounding country, with the success of Roman arms and the extension of the dominion of Rome. Even within the confines of Italy itself it was subject to similar influences, the effects of which are seen to-day in the dialectic and phonic difference existing between the spoken tongue of southern, central and northern Italy. These home changes were due to native dialects and Greek and Carthagenian influences at an early stage in the history of the peninsula and to

Germanic and other influences at a later period. But in the colonies still other influences were at work. Before noting these it is necessary to take a glance at the linguistic conditions produced by the dissolution of the Roman Empire. This event broke up the Latin or Roman tongue into nine or ten distinct languages generally designated as Rumanian, Rhæto-Romanic, Italian, Spanish, Portuguese, Catalán (Provençal), French, Dalmatian and Sardinian. Of these, Dalmatian disappeared at an early period in the history of these languages, owing to the fact that it had practically no native literature and that it was overrun by the Slavs, and the Roman tongue and culture were practically wiped out.

Southern Italy, under Greek influence, developed a distinct form of the Latin speech which was still further modified by other influences. The Rumanian tongue also strongly subjected to Greek influence, has developed along similar lines to that of southern Italy. France or Gaul, whose populace was principally Celtic, witnessed a terrific onslaught on the unaccented syllables of the Latin languages and a general shortening of the words of the vocabulary, coupled with a radical reconstruction of the construction of the Latin sentence, and the introduction into the common speech of many Celtic words. This was followed by a strong Germanic influence in the formation of the vocabulary of French in many of the offices of life.

Oscan-Umbrian.—The Umbrian tongue was spoken throughout central Italy; here too was the ancient habitat of the Picentes, Vestinians, Marrucinians, Paelignians Marsians, Sabines, Volscians and others, all with their own peculiar dialects, of which greater or less remains are extant in the form of inscriptions.

Umbrian.—Of the great Umbrian tongue there has come down to us more extensive remains than those of any other Italic tongue outside of Latin. The greater part of this body of linguistic remains is contained in the Iguvinian tablets, found at Gubbio, the ancient Iguvium, in the year 1444. The tablets average about 19 × 12 inches in size; they were originally nine in number, but in the 16th century two were lost while in transit to Venice and have since been lost to view. Seven of the tablets are inscribed on both sides, and the complete vocabulary has a range of almost 5,000 words. Two alphabets were employed: the Latin and the epichoric, a derivative of the Greek, through the medium of the Etruscan. The tablets very probably date back to the second century B.C. The contents consist of the acts of a certain guild or corporation, self-styled the Atiedian Brothers, and like the 'Acta Arvalium,' of a similar Roman brotherhood, the Fratres Arvales, made up of precepts for sacrifice, purification, taking of auspices, etc. The Umbrian dialect, while sharing in the special characteristics of the Oscan-Umbrian group, shows many secondary developments, some of which are paralleled by those witnessed in Latin within historical times. Such are the reduction of diphthongs to monophthongs and the loss of final *d*. Characteristic of Umbrian are further assibilation of *k* before light vowels as in fasia = Oscan *fakiiad*, Latin *faciat*; the change of intervocalic *d* to a sound represented in Latin by *rs*, in the epichoric by a special sign transcribed *d* or *r*, as in *piri*, *pirsi* = *pid-i* (Latin quid + *i*).

Oscan.—The remains of this language are found throughout Samnium, Campania, Lucania, North Apulia and neighboring regions. These regions were the dwelling-place of the Samnitic stocks, and here we are evidently dealing with the cultured language of the Samnites. In calling this language Oscan rather than Samnitic we are following the usage of the great Latin writers, as when Livy relates how in one of the Samnite wars the Roman consul sent out spies who were acquainted with the Oscan language. This usage is to be attributed mainly to the fact that the Oscans of Campania were the first people speaking the language in question with whom the Romans came in contact. But aside from this, the Oscans were far more advanced in civilization than the Samnites of the mountains, and if, as would appear from the highly cultured aspect of the language, an Oscan literature once existed, it must have taken its rise and found its standard of expression in Campania. In this case the designation Oscan would have more than an incidental foundation. As the Samnite people was Rome's only contestant for the hegemony of Italy, so their language was at one time the most widely spoken of all the Italic dialects, and speculations as to the result of a Samnitic victory upon Italy and the world are scarcely less interesting from a linguistic than from an historical standpoint. The Romans knew more of Oscan than, for example, of Umbrian, and the well-known remark attributed to Ennius, himself a native of Calabria, that he had three souls since he could speak Greek, Oscan and Latin, seems to imply that Oscan was regarded as something more than a mere dialect or *patois*. The 200 odd inscriptions, which, together with the glosses of Roman grammarians and lexicographers, represent all that is left us of the Oscan dialect, range in date from the second half of the 4th century B.C. to the second half of the 1st century of our era. Three alphabets are in use: epichoric, Latin and Greek. Of the inscriptions four are of considerable length. These are: (1) the Cippus Abellanus, inscribed on both sides with the terms of an agreement between the two cities of Nola and Abella. The stone was found in 1685 and is now preserved at Nola; (2) the dedicatory inscription of Agnone, a bronze tablet found at Agnone and now in the British Museum; (3) the Curse of Vibia, a leaden roll found at Capua in 1876. This is an execration, such as are often found in graves where they have been placed in order to make the curse, or devotion to the avenging gods of the lower regions, more effective; (4) the Tabula Bantina, a fragment of a bronze tablet, found near the site of Bantia in 1793. The inscription, of which about one-sixth is preserved, consists of a decree in regard to municipal government. Next in importance to these four are a series of road-makers' tablets and dedications found at Pompeii, and the so-called «jovilæ» inscriptions found at Capua. Coins with Oscan legends are numerous, and among them are the earliest remains of the language. Notwithstanding its inferiority to Umbrian in amount of extant material, Oscan is of all the Italic dialects the most important to the philologist. In relative

antiquity it is to the Italic branch what Gothic is to Germanic and Old Bulgarian to Slavic. In conservatism and transparency its vowel-system is rivaled by the Greek alone in the whole Indo-European field.

In Oscan diphthongs are preserved intact in all positions (cf. *deivinais* = Latin, *divinis; legatuis* = legatis, etc.); the weakening of vowels in unaccented syllables is, with certain possible limitations, unknown, as also in Umbrian (cf. *Anterstatai* = Interstitæ), and the finer nuances of pronunciation are expressed by a highly-developed and consistently employed orthographical system. The qualitative difference between long and short vowels (except the *a*-vowels), a difference which the Romance languages show to have existed in Latin, is more marked in Oscan than elsewhere. Short *e* is denoted by the *e*-character, but the long *e* has become so close in pronunciation as to be represented by the *i*-character (cf. sounds of *ε* and *η* in modern Greek). So too, long *o* is regularly denoted by *u*, not *o*, or by *ú*. Compare *Estuch* = Latin, *Esto; liqud* = Latin, *lēge; púd* = Latin, *quod*.

Minor Languages of the Oscan-Umbrian Group.—As already stated, in central Italy, midway between the Umbrians and the Samnites, dwelt the small stems of the Picentes, Vestinians, Marrucinians, Pælignians, Marsians, Sabines, Volscians, Æquians and the Hernici. Of their dialects the Pælignian is the best known, being represented by over 20 inscriptions. It shows a striking similarity to Oscan, even in cases where the point in question is a departure from, rather than a retention of, the original. But variations from Oscan are not wanting. The dialect of the Marrucinians is represented by one well-preserved inscription and a fragment. This, too, is more closely related to Oscan than to any other dialect, but in the accusative plural *iaf* "eas" agrees with Umbrian (*eaf*) rather than with Oscan (cf. viass = vias). Volscian is known through only one inscription, the bronze of Velletri. It shows a number of secondary changes, such as the conversion from diphthongs into monophthongs, loss of final *d*, assibilation of *k* before light vowels, which give it a stronger similarity to Umbrian than to Oscan. The Marsian and Vestinian dialects have also dispensed with diphthongs.

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ITALY, kingdom of southern Europe, comprising the whole of the great Mediterranean peninsula extending southeast from the Alps, together with Sicily, Sardinia and some smaller islands. The name *Italia* was applied in ancient as in modern times to the peninsula, which on the west and south is bounded by the Tyrrhenian Sea and by France, on the north by Switzerland and Austria-Hungary, and on the east by the Adriatic and Ionian seas. Italy is the mother of the Latin nations for it was there that the civilization, which we term Latin, had its beginnings. The artistic, linguistic, political and religious development of Italy are among the most interesting and most important in the history of mankind. These topics, together with the geography, social customs, modern educational systems and commercial life of modern Italy from the downfall of Rome are here treated under the following heads:

1. Physical Geography.
2. Italian Archæology.
3. History of the Middle Ages in Italy.
4. The Renaissance in Italy.
5. Italian Modern History.
6. Italian History from 1815 to 1907.
7. History from 1907 to 1919.
8. Political Administration.
9. The Crown and Parliament.
10. Communal and Provincial Administration.
11. Department of Justice.
12. The Papacy and the Government.
13. Political Parties.
14. Italian Socialism.
15. The Italian Army.
16. The Naval Marine.
17. Religion in Italy.
18. Education in Italy.
19. Italian Schools and Universities.
20. The Education and Social Status of Women in Italy.
21. Italian Language.
22. Italian Literature.
23. Art in Ancient Italy.
24. Historical Synopsis of Italian Art.
25. Italian Art in the 19th and 20th Centuries.
26. The Natural and Physical Sciences in Italy.
27. Italian Music.
28. Economic Conditions in Italy.
29. Agriculture in Italy.
30. Italian International Commerce.
31. Italian Finance.
32. Italian Emigration.
33. Italy, Diplomatic Relations of the United States With.
34. Italy and the War.

1. PHYSICAL GEOGRAPHY. Geographical Position.—Italy lies in the south of Europe and is in the middle of the two other southern peninsulas—Spain and Greece, forming the extreme European extensions toward Africa and Asia. Italy is almost in the middle of the Temperate Zone.

The distance of its various portions from the equator (latitude) is about the same as the distance from the equator of the New England States of America, of New York, Pennsylvania, New Jersey, Maryland and Virginia, its position being between 36° 38′ and 46° 40′ lat. north and 6° 30′ to 18° 30′ long. east of the Greenwich meridian.

As to its distance from the United States, between Rome and New York there are 4,172 miles. In time there is a difference of 5 hours 45 minutes, so that when it is midnight in New York it is 5.45 A.M. in Rome.

Perimetric Configuration.—Italy, which by reason of its characteristic form in the atlas has been compared to a boot, is divided geographically into three parts: (1) Continental Italy, partially bounded by the Alps to the north, by the Sigurean Sea to the west and by the Gulf of Venice to the east, is wider from east to west than from north to south; (2) Peninsular Italy, a little more extensive than the Continental portion, situated from northwest to southeast, bounded on three sides by the Mediterranean Sea, which takes the distinctive name of Tyrrhenian Sea on the west; of Ionian Sea toward the southeast and

of Adriatic on the east; (3) Insular Italy, which comprises, besides numerous smaller islands, the large islands of Sicily, Sardinia and Corsica, which enclose the Tyrrhenian Sea on the south and west.

Historical Position.— On account of its situation in the midst of the Mediterranean, into which it extends from the continent of Europe like a natural mole, 621.4 miles long, from northwest to southeast, and flanked at an inconsiderable distance by two other peninsulas, it was most favorably situated to play a prominent part in the history of human progress, and particularly until the discovery of America, i.e., during the many centuries in which, before the conquest of the Atlantic Ocean, there were concentrated in the Mediterranean the most successful efforts and the most glorious annals of human history. No country of Europe can compete with Italy in worthy historical memories, both in the ages of antiquity and in the Middle Ages; and from the middle of the 10th century to the present time, after the cutting of the Isthmus of Suez, the importance of the Mediterranean has again greatly increased; and as the unification of all the Italian states into one nation occurred about this time, there began for Italy a new historical period in which are already evidences of new progressive growth in the country.

Boundaries.— The boundaries of Peninsular Italy are the three seas already mentioned; but on the continental and insular portions there are different opinions. There is no question regarding the political boundaries, since Italy is politically bounded by the confines of the kingdom, which were recognized in the last treaties, and liable to be changed by subsequent treaties. The difficulty arises in regard to what are called natural boundaries, for the reason that various authors start from different standpoints — some taking purely geographical lines; others ethnographical, or linguistic; others military, or historic boundaries, etc. On this point Italian writers differ not only with foreign authorities on the subject, but they also differ among themselves. And this is not unnatural. Along the boundary line between Italy and the European Continent there have been through the ages so many historical happenings and so many different races, that the distinguishing traits of nationality and language are no longer clearly defined, but are blended in promiscuous belts, which must account for the varied opinions of the writers. But it must be remembered that the ethnographical, linguistic, military and historical data referring to the past, present or future distribution of tongues, and political or social institutions belong properly to anthropological and sociological geography, whilst physical geography, of which alone we are treating at present, deals with nothing but the physical characteristics of a country. Therefore the clearest and simplest way of treating of a peculiarly mountainous region is the orohydrographic point of view by which we begin by tracing on the immense extent and variety of forms of the Alps the dividing line between the water-sheds of the opposite regions. This leaves well defined the principal part at least, if not all of the northern boundaries along the Alps, following the line which separates the water-sheds of the Rhone, the Rhine and the Danube, which have nothing to do with Italy, from those of the Po, the Adige and other Alpine rivers which undoubtedly belong to Italy. But even in regard to these physical boundaries there is a difference of opinion as to where should be fixed the extreme limits of the east and west boundaries of the continental portion and the exact limits of the fluviatic basins.

Other uncertainties may arise, and for the same reason, although in lesser proportion, even in the insular portions of Italy which gave rise to controversy regarding the assignment to Italy of certain islands in the Dalmatian Archipelago and in the Sicilian Sea. As for the remaining islands, both large and small, geographers as well as geologists assign them to geographic Italy, on account of their proximity to the mainland, as well as to their geological formation, to the shallowness of the water between them and the mainland, etc.

Extent.— The natural, or geographical, extent of Italy computed according to this standard is 321,570 square kilometers (124,157 sq. m).

Of this extent of area 40 per cent belongs to Continental Italy; 42 per cent to Peninsular portion and 18 per cent to the islands. The kingdom of Italy comprises 89 per cent of this — practically 110,623 square miles; and the area of the Italian colonies in 1916 was 601,200 square miles. Italy's area in Europe alone is exceeded by that of Russia, Austria-Hungary, Germany, France, Spain and Sweden. The kingdom of Italy amounts in area to only the 25th part of that of the United States of America, and exceeds slightly the area of the New England States and New York combined.

Sea Coast.— By reason of its special shape and position, of its extending into the midst of the sea and of the many islands which belong to it, geographical Italy has a very extended coast line, of which only 51 per cent belongs to the mainland and the rest to the islands. On that account the length of the coast line is sufficient to enclose a circular area more than four times as large as the area of Italy. And that is why, owing to this superabundance of coast, which is one of the fundamental conditions for the development of maritime activity, Italy has no naval superior in Europe, except in Great Britain.

However, the historical or sociological value of these coasts is very diverse. In the first place they are not sufficiently indented, as for instance are the coasts of Great Britain. Moreover, there are long stretches of coast without natural landing facilities or harborage for vessels of considerable tonnage.

The northerly portion must be excepted, as it carries on an extensive internal and foreign commerce, which by its exports and imports greatly stimulates maritime activity.

The uniform coasts of the Adriatic are especially poor in good harbors, as are the steeper and more varied coasts of the Ionian Sea, of Tyrrhenian Calabria and of the more westerly isles.

With all this there are more favored tracts of coast, especially along the Tyrrhenian Sea, where the coast is often precipitous and forms an uninterrupted series of gulfs with high promontories beneath which the beach curves in large semi-circles. But the most favored of all are the small but attractive Gulf of Speria, best adapted by nature to the military requirements of the country; the splendid Bay of

Environs of ROME.
SCALE.
Statute Miles, 3½ = 1 Inch.
ROME
SWITZERLAND
LOMBARDY
VENETIA
PIEDMONT
TUSCANY
MARCHES
UMBRIA
ABRUZZI AND MOLISE
LATIUM
CORSICA (FRANCE)
AUSTRIA-HUNGARY
ADRIATIC SEA
GULF OF VENICE
GULF OF GENOA
APENNINES
ALPS
FLORENCE
VENICE
MILAN
TURIN
GENOA
NAPLES
Tivoli
Frascati
Palestrina
Albano
Velletri
Civita Vecchia
Ostia
Fiumicino
Porto
Tafetti
Castel la Cecchina
Mangani
Castel del Pazzi
Fort Antenne
Villa Maria
Villa Ada
Villa Borghese
Villa Filippiani
Villa Pamphilj
Villa Doria
Villa Belli
Villa Acquari
Villa Ricci
Villa Rosei
Villa Consorte
Villa Zega
Villa Neri
Villa Vigna Bucci
Villa Antica
Villa Aurelia
Villa Boccanera
Villa S. Paolo
Villa Sebastiano
Villa Certosa
Villa Casilina
Villa Tavolato
Villa Appia
Villa Capannelle
Villa Abbatia delle Tre Fontane
Villa Ponte Bottero
Villa Valbetta
Villa Fort Ardeatina
Villa Fort Portuense
Villa Fort Prenestina
Villa Fort Tiburtina
Villa Fort Casilina
Villa Fort Appia
Villa Fort Tavolato
Villa Fort Pinciana
Villa Fort Salaria
Villa Fort Nomentana

ITALY
SCALES
Statute Miles, 67 — 1 Inch.
0 25 50 100 150
Kilometres, 110 — 1 Inch.
0 25 50 100 150 200
Rand McNally & Co.'s New 11 x 14 Map of Italy.
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Longitude East from Greenwich.
TYRRHENIAN SEA
MEDITERRANEAN SEA
SARDINIA
CAMPANIA
BASILICATA
CALABRIA
SICILY
LIPARI ISLANDS
GULF OF TARANTO
Strait of Bonifacio
Gulf of Asinara
Gulf of Orosei
Gulf of Oristano
Gulf of Cagliari
Gulf of Castellamare
Gulf of Policastro
Gulf of Salerno
Bay of Naples
Strait of Messina
Gulf of Squillace
Gulf of Tunis
Gulf of Hammamet
NAPLES
MT. VESUVIUS
PALERMO
MT. ETNA
MT. GENNARGENTU
MT. LIMBARA
MT. ALVO
MT. URTICU
MT. LINAS
MT. SEVERA
CAGLIARI
POTENZA
CATANZARO
TUNIS
ALGERIA
AFRICA
MALTA (Ba.)
GOZO I. (Ba.)
Bonifacio
Cala d'Oliva
Asinara I.
Caprera I.
Tavolara I.
Coda Cavallo
Portotorres
Sassari
Alghero
Siniscola
Bosa
Macomer
Dorgali
Orosei
Oristano
Tortoli
Lanusei
Iglesias
Muravera
Carloforte
San Pietro I.
Sant'Antioco I.
C. Carbonara
C. Teulada
C. Spartivento
Ustica I.
Trapani
Marsala
Levanzo I.
Favignana I.
Marittimo I.
Mazzara del Vallo
Sciacca
Girgenti
Licata
Terracina
Gaeta
Ischia I.
Capri I.
Amalfi
Salerno
Agropoli
Palinuro
Sapri
Paola
Cosenza
Rossano
Cariati
Crotone
Cotrone
Nicastro
Catanzaro
Stromboli I.
Lipari I.
Salina I.
Alicuri I.
Felicudi I.
Vulcano I.
Reggio (di Calabria)
Bianco
Melito di Porto Salvo
Scilla
Gerace
Roccella
Cittanova
Polistena
Nicotera
Tropea
Pizzo
Amendolara
Trebisacce
Corigliano Calabro
Belvedere
Cetraro
Scalea
Diamante
Verbicaro
Castrovillari
Lauria
Lagonegro
Policastro
Sapri
Pisciotta
Polla
Sala
Eboli
Battipaglia
Paestum
Agropoli
Vallo della Lucania
Sicignano
Potenza
Tricarico
Matera
Gravina
Altamura
Acquaviva
Gioia del Colle
Martina Franca
Laterza
Ginosa
Massafra
Taranto
Mandurria
Manduria
Nardo
Gallipoli
Ugento
Alessano
Otranto
Castro
Galatina
Lecce
Brindisi
Ostuni
Monopoli
Fasano
Bari
Molfetta
Trani
Barletta
Andria
Canosa
Bovino
Orsara
Ariano
Benevento
Caserta
Capua
Aversa
Nola
Avellino
Nocera dei Pagani
Sarno
Torre Annunziata
Castellammare
Sorrento
Vietri
Cava
Salerno
Eboli
Battipaglia
Paestum
Agropoli
Vallo della Lucania
Sicignano
Padula
Polla
Tegliano
Stigliano
Bernalda
Pisticci
Tursi
Senise
Lauria
Oriolo
Rocca Imperiale
Roccafalumba
Prizzi
Corleone
Salemi
Calatafimi
Alcamo
Partinico
Castellammare
Carini
Monreale
Palermo
Bagheria
Cefalù
Termini Imerese
Caltavuturo
Petralia
Mistretta
San Fratello
Randazzo
Troina
Tagrinia
Linguaglossa
Giarre
Acireale
Catania
Paternò
Adernò
Bronte
Niccola
Leonforte
Assoro
Enna
Caltanissetta
Castrogiovanni
Piazza
Mazzarino
Riesi
Naro
Caltagirone
Militello
Grammichele
Vizzini
Floridia
Augusta
Syracuse
Noto
Avola
Modica
Ragusa
Comiso
Vittoria
Scoglitti
Licata
Butera
Niscemi
Palazzolo Acreide
Pachino
C. Passero
Scicli
Ispica
Modica
Ragusa
Comiso
Vittoria
Scoglitti
Licata
Butera
Niscemi
Palazzolo Acreide
Pachino
C. Passero
Scicli
Ispica
Pantelleria I.
Linosa I.
Lampedusa I.
Cape Bon
Kelibia
Menzel Heurr
Nabeul
Hammamet
Hergla
Susa
Monastir
Lamta
Bizerta
Cape Serrat
Cape Negro
Tabarca
La Calle
Cape Rosa
Bone
Tunis
Valetta
Malta
Gozo I.
Ponza I.
Palmarola I.
Zannone I.
Ventotene I.
Procida I.
Ischia I.
Capri I.
Sorrento
Castellammare
Vietri
Cava
Salerno
Amalfi
Gulf of Salerno
Bay of Naples
Naples
Mt. Vesuvius
Nola
Avellino
Nocera dei Pagani
Sarno
Torre Annunziata
Aversa
Caserta
Capua
Gaeta
Terracina
Itri
Fondi
Formia
Sperlonga
Gaeta
Cajazzo
Benevento
Ariano
Bovino
Orsara
Canosa
Andria
Corigliano
Barletta
Trani
Molfetta
Bari
Polignano
Monopoli
Fasano
Ostuni
Brindisi
Francavilla
Oria
Ceglie Messapico
Latiano
Campi
Lecce
Nardo
Galatina
Gallipoli
Ugento
Otranto
Castro
Alessano
Triocase
Tricase
Gallipoli
Magliè
Galatone
Nardo
Manduria
Maruggio
Sava
Taranto
Massafra
Crispiano
Martina Franca
Locorotondo
Cisternino
Fasano
Ostuni
Carovigno
Brindisi
Francavilla
Oria
Latiano
Mesagne
Torre Santa Susanna
Campi
Lecce
Nardo
Galatone
Gallipoli
Ugento
Otranto
Castro
Alessano
Tricase
Triocase
Leuca
Santa Maria di Leuca
Capo di Leuca
Gallipoli
Magliè
Galatone
Nardo
Manduria
Maruggio
Sava
Taranto
Massafra
Crispiano
Martina Franca
Locorotondo
Cisternino
Fasano
Ostuni
Carovigno
Brindisi
Francavilla
Oria
Latiano
Mesagne
Torre Santa Susanna
Campi
Lecce
Nardo
Galatone
Gallipoli
Ugento
Otranto
Castro
Alessano
Tricase
Triocase
Leuca
Santa Maria di Leuca
Capo di Leuca

Naples, the richest in natural attractions, the centre of the greatest agricultural and fishing industries, toward which are attracted the commercial interests of almost the whole of southern Italy; and the spacious Gulf of Genoa, with its magnificent Riviera of Levante, and of Ponente, almost without any lowland, particularly the Levant Riviera, which is cultivated like a garden. From this Gulf of Genoa extend the principal thoroughfares to the chief industrial provinces of Italy, and toward the richest European countries outside of Italy. On the Adriatic Sea the opening of the Suez Canal restored the old-time international value of the Brindisi coast, and that of the less ancient, but much larger, Venetian coast. And the fisheries of the same gulf and its lagoons give a still greater value to certain small inlets and indentations in the coast, which suffice for the moderate needs of fishing boats.

Oro-Hydrographic Conformation.— The surface of Italy is chiefly mountainous. The largest Italian plain, slightly above sea-level, extends through the continental portion, i.e., in northern Italy. This plain has an area about equal to the combined areas of New Hampshire and Vermont.

Peninsular Italy, and especially the islands, is covered for the most part with mountains and hills, between which are numerous valleys diverse in appearance and extent; some quite large, particularly along the lower course of large rivers and in the vicinity of the sea coast. In the regions traversed by the largest chains of the Apennines there are some vast and high valleys entirely enclosed by opposite chains of mountains, such as the tableland of Aquila (Aterno), of Rieti (Velino) and of Perugia (Alto Tevere). But all the plains of Italy, taken together, represent but a third part of the entire area distributed in various regions, in varying proportion, so that the mountainous area is equal to about 56 per cent of northern Italy; and 67 per cent of central Italy; 60 per cent of the islands of the kingdom. The mountainous area is even greater in those portions of the Italian regions outside the kingdom.

The Plains.— The great northern plain is formed by the level portion of the river basin of the Po in Venetia, Lombardy and Romagna. In middle Italy the larger plains extend along the Tyrrhenian coast in varying width between the Magra and Terracina, and flank the middle and lower banks of the Tiber, the Arno and the Ombrone. In the south these plains are in the classic Campania felice, on the sides of the Garigliano and Volturno, and toward the Adriatic form the tableland of Apulia. In the islands the largest plain is that of Campidano in Sardinia.

These plains are formed chiefly by alluvial deposits caused by the agency of atmospheric forces and by erosion of the base and flanks of the surrounding mountains and distributed by currents of water in areas which primarily, at least in certain localities, were seas. We find this in the greatest proportion in the valleys of the Po and Venetia, which geologists assure us were in former days a portion of the present Gulf of Venice, which extended like a deep indentation as far as Piedmont.

Mountains.— The mountains of Continental and Peninsular Italy are divided into two systems: that of the Apennines and that of the Alps. The island mountains are considered, particularly by geologists, as continuations, to a greater or less extent, of the mainland chains. The system of the Apennines belongs entirely to Italy. This is not the case with the Alps, which extend for the most part into other countries, as France, Switzerland and Austria-Hungary. They form, as has been said, the land boundaries of Italy, not in the sense that Italy terminates at their southern base, although we consider as geographically Italian — as previously mentioned — all the Alpine regions whose streams empty into the river Po and into the Venetian rivers.

To this belong partly or entirely many of the great Alpine colossi (from 11,000, or a little more, to 15,781 feet) such as Mount Viso in the Cotian Alps, the Gran Paradiso, in the Gratian Alps, Mont Blanc and Monte Rosa, in the Pennine Alps, or Valletian Alps, the Adula (Rheinwaldhorn), in the Lepontine Alps, the Bernina, the Orteles, the Adamello, the Wildspitze in the Rhetian Alps, the Vedretta Marmolata in the Dolomitic, or Cadorine Alps, and many others. And the most important thing to observe is, that in this part of Italy there arise from the great plains of the Po and Venetia numerous valleys, many of which are situated in an almost normal direction to the geographical axis of the whole system, and pursue a relatively short course from the Italian lowlands to the heart of the whole mountain region, reaching almost to those long longitudinal, or oblique valleys of the Upper Rhone, the Upper Rhine, the Inn, the Drave, etc., which are characteristic of the non-Italian Alpine watersheds, and which lead to the flourishing European countries situated on the slopes of the whole mountain system.

Through this singular conformation, the passes, the cols, the saddles, which are found along this boundary were necessarily destined to become the doors of communication between the inhabitants of either water-shed, with the double difference — serious on account of its advantages, as on account of its perils — that, in the first place, in the north one can reach these passageways by long valleys of easy ascent, whilst to the south one has to climb a more precipitous ascent. As T. Fischer says, these gateways are adapted rather to enter Italy than to leave it; and again, these passes radiate and diverge in three directions from Italy as a centre — to the west, north and east — toward the three principal centres of European population, and these three nations all have on the side of the Mediterranean only one neighbor, whilst Italy, on the north, has to deal with three.

The Apennines.—As for the Apennines, they form geographically, and not geologically, the continuation of the Maritime Alps along the Gulf of Genoa, enclosing on the south Continental Italy. They then turn their axis in an oblique direction from northwest to southeast, traversing the whole of Peninsular Italy. They form a great curve with the concave portion toward the Tyrrhenian Sea, and in central Italy they extend their principal masses rather toward the Adriatic, approaching then the Tyrrhenian Sea in southern Italy, i.e., the Campania, the Basilicata and Calabria. Geographers now make the dividing point between the Alps and the Apennines the Col di Cadibona, or Altar Pass in the west-northwest of

Savona. The Apennines form neither a single nor a continuous chain; but from the principal branch they separate into several spurs and ramifications, or the main chain spreads out in clusters or groups of mountains with terraces, and noted tablelands, such as those of Aquila, Rieti and Perugia, or divide into a number of chains more or less parallel to each other. Geologists do not attribute to the proper Apennines many of the mountains in the western part of the peninsula — which includes a great part of Tuscany, of Latium, of the Campania and some portions of Calabria — the mountains and tablelands of Apulia, the volcanoes and part of the Peloritani, in Sicily, all those of Sardinia, of Corsica, of the Tuscan Archipelago and many others. The groups and chains, denied by geologists to the Apennines, are assigned by them to other formations, belonging to an earlier geological period, which makes the geography of Italy assume a very different aspect.

Certainly the geological variations found in the study of these lands have great value, not alone in the line of science, but also in regard to the present orographic surfaces, to their permanency and to their mineral and vegetable products, with all the consequences that ensue in the various regions owing to the habitation of man. Geography shows us primarily that the mountains of the peninsula, as compared with the Alps, are not of any great extent or elevation, none of them attaining a height of 9,750 feet — except Mount Ætna, which is out of the peninsula and is a volcano; and that the greater number of them are scarcely 6,500 feet high. The highest peaks are found in the most mountainous part, within the limits of Abruzzo, which contains the greatest mountain masses of the Apennines and the highest tablelands in the peninsula. In this region is Mount Vettore (8,043 feet) in the Sibilline Mountains between Nera (Tiber) and Tronto; the Peak of Sevo (8,050 feet) to the right of the source of the Tronto; Terminillo to the right of Upper Velino (Nera Tiber); the Gran Sasso d'Italia (The Great Rock of Italy) to the right of Upper Vomano, with many points higher than 6,500 feet, and Monte Corno (9,493 feet), which is the highest peak in the peninsula. Majella has also similar altitudes, among which the highest is Monte Amaro (9,084 feet) to the left of the source of Aventino (Sangro); then Mount Velino, Sirente, Mount Petroso, Mount Meta, Viglio, and about 10 others. There are few considerable altitudes in the rest of the peninsula, one or two in the southwest of the Basilicata, none in the islands except Ætna, and a few summits in Corsica, among which the highest is Monte Cinto (8,807 feet).

Compared with other and less mountainous countries useful minerals are relatively scarce in Italy. A young country, from a geological point of view, it does not possess in its Apennines such mineral products as are furnished by more ancient formations and which are an element of power to other European nations. Iron ore is mined specially in the not extensive island of Elba; other metals, but not in large quantities, are found in Sardinia, and in the Alps of Lombardy and Venetia. Fossil coal of the best quality is found nowhere; on the other hand, much sulphur is found, especially in Sicily. Statuary marble is found in Tuscany, in the Apuan Alps and always in places where the mountains are not of the formation assigned by geologists to the Apennines. But the fact remains that the mineral products do not constitute a factor in the wealth of Italy.

If we finally consider the Apennines in their general external aspects, the observing traveler who has crossed the Alps will find that the mountains of the peninsula differ from them not alone in height, but also in other special characteristics. There is wanting in the Apennines, in almost all their extent, the fearful and wild grandeur of much Alpine scenery; there are wanting the glaciers and the perpetual snow; there is wanting the Alpine vegetation, so rich in varied tints and extending in some parts to the most unusual altitude. The Apennines, on the contrary, are less ponderous, less dentated, less varied, less severe and precipitous, the valleys less narrow and hemmed in, but also with scantier and less varied vegetation, and with many barren tracts, showing the bare sides of rock.

But as a compensation there are numerous large and pleasant valleys in almost every direction, where the regular sections of land, with a variety of cultivation, with verdant hills and mounts covered with villages, with a sky that is almost always bright, make a pleasing contrast to the barrenness of the distant mountains.

Rivers. — The outline and character of the Italian mountains is pretty clearly found in the physical hydrography, in the climate, in vegetation and, finally, in the great lines of Italian history.

Beginning with the waters we find in the north, as well as the largest plain, the largest river of Italy, the Po, which crosses the entire valley in its greatest extent from west to east, and which, in proportion to the modesty of its length (only 260.9 miles in a straight line), may be considered to have the greatest volume of water of any river in the world. The hydrographic basin of the Po and its tributaries is relatively of great extent; for to every kilometer of its course there are more than 104 kilometers of tributary area.

The amount of water that the Po carries to the sea (greater in the seasons of the heavy rains and the melting of the snows) is always quite large, for the reason that when the contribution of the Alpine tributaries, the Adda, Ticinus, etc., is less abundant, i.e., in winter, that of the Apennine tributaries, the Panaro, Taro, etc., is more so. The volume of water is greater in October and May, and it often does great damage to the surrounding regions. However, notwithstanding all this abundance of water, the Po, as a medium of navigation, does not present the facilities that might be expected, for it works potently and unceasingly to change not only its banks, but also the position and extent of its many sand and mud banks; and its various outlets into the sea are neither ample, nor deep, nor permanent. Its waters carry and deposit around and about its mouth in the Adriatic great quantities of mud, which gradually form an extension of its mouths into a belt of land estimated to increase about 244 feet a year. These deposits would be larger still, if the waters contributed by its most important Alpine affluents, the Adda, Ticinus, Oglio and Mincio, were not purged of all detritus, which

they get rid of in crossing the Lombard lakes.

Among the Alpine rivers which flow into the Adriatic must be mentioned the Adige, which, as compared with the Po, is inferior in the length of its course by only about a third, but is also four-fifths smaller in the amplitude of its hydrographic basin and still less in its volume of water.

In the peninsular portion and in the islands of Italy, the not extensive area and the special distribution of the mountains do not permit the formation of large rivers; those on the Adriatic coast of the peninsula, where are found the principal groups of the Apennines, are the smallest. Here, on account of their short and precipitous course, the rivers are more like torrents, except the Reno, which traverses the Romagna plain for a long stretch, and some that rise behind the crest of the coast chain in its ponds and recesses, as the Sangro, the Pescara, etc. In the Ionian Sea also similar causes, and, in addition the prolonged drought in summer, withdraw every value also from the larger rivers, such as the Busento, the Bradano, etc. But to the west of the Adriatic chain of the Apennines there is more diversity and less uniformity in their knots and sinuosities, for being more numerous they can form valleys in directions more or less oblique to the coast line, uniting longitudinal tracts of valley to transverse tracts, and hence they can develop larger rivers with more extensive basins, as the Tiber, the Arno, the Volturno, the Liri-Garigliano, etc.

The Tiber, the river of universal historic fame, is the largest river of peninsular Italy. Its length is almost equal to that of the Adige, but its hydrographic basin is more than one-fourth larger. Its sources (Monte Fumajolo) are about 149 miles distant from those of its most southern affluents, the Aniene and the Teverone (Monte Viglo) in a direct line from north, northwest to south, southeast. It receives the waters of almost the entire Tyrrhenian water-shed from the greater Apennine groups. For that reason, especially from autumn to spring, it is liable to frequent floods, according as the downfall of rain and the melting of the snows occur in one or other or all parts of its vast basin. The country, and chiefly the city of Rome, suffered greatly from these floods until the recent works of systemization in the city, which formerly experienced every year, and even several times a year, the invasion of the river which overflowed the lower wards to a depth of 10 or 12 feet. The Tiber also continues by means of deposits to extend its estuary. From the time of Christ up to our day it has added a stretch of beach more than two and one-half miles wide.

The Arno, the Tuscan river, so celebrated in the history of civilization and so dear to votaries of the arts, has a course only three-fifths as long as that of the Tiber, and hardly half the extent of its basin. Its principal valleys may be distinguished by natural diversities very marked in four regions, i.e., in the Casentina, or Casentine Val d'Arno, wider and less impetuous up to its junction with the Tuscan Chiana; the Upper Val d'Arno, shut in between the opposite chains of the Pratomagno and the Chianti; and the lower Val d'Arno, from its confluence with the Sieve until it reaches the sea, the most flourishing portion of Tuscany. But even in this last region it recalls the type of torrent, as much by the coarse deposits from the bed of the river as by the tremendous force and agitation of its waters. At Florence it may rise from a minimum flow of three cubic metres to a maximum flow of 1,000 cubic metres, and in exceptional cases to 2,000 cubic metres of water a second. And at Pisa, on the level plain, it may fall from 2,000 cubic metres at flood to a low level of 15 cubic metres a second. Its flood tides are most often in December, and in the preceding and subsequent months. Its lowest tide is in summer. The matter deposited at its mouth from the time of the Romans up to the present day forms a stretch of beach more than five miles wide.

Lakes.—Among the Italian lakes worthy of special mention are the beautiful Lombardy lakes, Lago di Gardi, or Benaco, 140 square miles in extent; Lago Maggiore, or Verbano; Lago di Como, or Latrio; Lago di Lugano, or Ceresio, d'Iseo, or Sebino, di Varese, etc., which are long valleys enclosed between spurs of the Alps, shut in and protected toward the north by the mountain, more open toward the south, and girdled by abandoned moraine hills, by ancient glaciers, with less imposing scenery, in general, than that of the Alpine lakes of Switzerland, but yet more pleasant on account of the smiling southern landscape and vegetation; great basins of deposits, where the abundant waters of the rivers are purified before irrigating the luxuriant Lombard country. In other parts of Italy are scattered smaller lakes, historically famous, as the Trasimeno or Lake of Perugia, the Lago di Bolsena, the Sabatino or Bracciano Lake, of Vico, of Albano, of Nemi, not far from Rome, situated in the craters of spent volcanoes; and many coast lagoons, such as the Venetian lagoon, the ample Val di Comacchio, situated north of Ravenna, the lakes of Lesina, of Salpi to the north and south of the spurs of Gargano, and several others.

Climate.—There is a great diversity of climatic conditions in the different regions of Italy, caused not alone by the difference in latitude, but also the multiplicity of the ramifications of its principal mountain systems.

Italy is very long from north to south compared with other countries. The German Empire, for instance, covers less than 8° of latitude; the kingdom of Italy, which is a little over half as large as Germany, covers more than 10°. Hence it follows that in the most northerly regions the sun does not set in certain places in summer until almost one and one-half hours later and in winter almost one and one-half hours earlier than in more southerly points. At the same time, however, the angle of incidence of the sun's rays on the horizontal plane in various places becomes greater at all places in the south and attains to 10° more than in the north; and it exercises therefore a much stronger calorific influence. Therefore the longer continuance of heat of the long summer day in the north is made up for in the south by the greater intensity of the sun's rays and the continued clearness of the sky, and the difference in the summer temperature between the north and the south of Italy would tend to diminish, while in winter the greater length of the day as well as the greater intensity of the

sun's rays combined produce a condition advantageous to the southern portion, and the climatic differences in winter between the two portions of the country also caused by the sun in diverse latitudes will be more marked.

But to increase this meteorological diversity there enters the special oro-hydrographic configuration of the country. The sea which surrounds Italy, and which, except in the northern portion, is distant a maximum of almost 62 miles from any inland point, tends to lessen these extreme differences, but in very diverse ways according to the direction of the prevailing winds, and the mountain ranges.

Thus the great northern plain enclosed on three sides by mountains, as if it were a great amphitheatre, sloping down and open toward the little *Mar di Venezia*, does not profit as much by the tampering action of the sea as the rest of that portion, whilst it is exposed almost without protection to the atmospheric influences from the interior of the eastern European continent; its climate becomes necessarily "Continental," i.e., extreme, with intense cold in winter, and great heat in summer, no more than one might expect from its greater distance from the equator. In fact, the temperature in Palermo in midsummer is 23°.9 centigrade; in Naples 23°.2; at Venice 23°.1; at Milan 23°; whereas in winter it is 11°.2 at Palermo; 8°.8 at Naples; 3°.7 at Venice; and 2°.2 at Milan. To this must be added the other great climatological factor of rainfall. The magnificent bulwark of the Alps which encircles Italy to the north acts as a powerful condenser of the moisture of the atmosphere, carried by the prevailing winds from the Tyrrhenian Sea, whence the enormous downfall of rain and snow which the year round feeds the numerous affluents on the left bank of the Po, and the rivers flowing into the Gulf of Venice. The amount of rain reaches in northern Lago Maggiore (Cannobio) yearly 1,332 millimeters, and this is higher on the Carnic Alps (yearly 2,248 millimeters), where the currents of moisture from the Mediterranean spend themselves, either surmounting the minor obstacle of the depression in the Ligurian Apennines, or avoiding this obstacle traveling by way of the long channel of the Adriatic. In Peninsular Italy, on the contrary, the special distribution of the Apennines and of the prevailing aerial currents produces a diversity of favorable conditions in the various regions. The Apennines and the other mountains sloping toward the Tyrrhenian Sea are more frequently exposed to warm and damp currents deviating more or less from southwest direction, while on the Adriatic slope there is in winter exactly the opposite, and in summer a great variation of currents. Hence, in all the country situated on the Tyrrhenian Sea from the Ligurian Riviera to the Gulf of Salerno there is a more copious rainfall. The regions at the base of the northern slope, on the contrary, have a smaller annual rainfall. Still smaller is the rainfall around the Plain of Foggia and near the Gulf of Tarentum, and in almost all the islands.

To the vegetation, however, is no less important than the annual amount of rain, the manner in which it is distributed in the different seasons. In the southern portion there are two months during the warm season in which there falls not a drop of rain. In the north rains are frequent even in summer, often in the form of noon-day thunder showers, which are destructive to the ripening fruit in the fields. (Summer average of rainfall: Palermo, 28 mm.; Naples, 55 mm.; Venice, 198 mm.; Milan, 236 mm. Winter average: Palermo, 292 mm.; Naples, 281 mm.; Venice, 123 mm.; Milan, 193 mm.).

From all this we may conclude that it is not very exact to speak of "the climate of Italy," when there are so many different climates, according to the topography of the various regions.

Local conditions serve again to modify these distinctions, and are determined more especially by the formation, altitude and position of the mountains and valleys with regard to the prevailing direction of the aerial currents.

But all these variations do not modify the influence of latitude to such an extent as to prevent Italy, especially on the Tyrrhenian and in the central and southern latitudes, from being noted, in comparison with Europe, for an extraordinary mild climate, rendered still more agreeable by a larger number of cloudless days, and often made delightful by an enchanting splendor of the sky.

Animal and Plant Life.— In consequence of these conditions it is enough to refer to the characteristics of the Italian vegetation. The Italian flora is considered by botanists to be exceedingly varied, owing to the temperate climate, as well as to the variety of climates which are suitable to a greater number of botanical species. In addition to this, for a long period, man has voluntarily, and involuntarily, been increasing the species. Together with plants belonging to cold regions, there flourish in certain places plants belonging to warm countries. To mention only the best-known species, in the south there are orange groves, hedges of agave and spunzie, and cotton, sugar-cane and date palms ripen there; but many of these and other more or less tropical plants may be found also in places on all the Tyrrhenian slope as far as the north, where they even brighten the Ligurian landscape. Similarly, there grow quite extensively in Italy, especially near the sea, evergreen trees and shrubs, which give a characteristic appearance to the winter landscape. But most important of all is the olive, which grows all over central and southern Italy as high up as 1,600 or 1,900 feet above sea-level, and in the islands as high up as 2,600 feet. The olive does not grow in the Venetian and Po plains, on account of the severity of the winters, but it may be found in places protected from the north wind and weather, as on the sunny slopes of the Lombardy and Venetian foothills of the Alps, and of the volcanic Colli Euganei. And together with the olive may be found other southern vegetation. In the plain of the Po the summer climate makes remunerative the cultivation of not only vines and other fruit-bearing shrubs, and exotic plants, but also the cultivation of rice. In the whole of Italy, therefore, in the plains and on the less precipitous slopes are cultivated the different cereals, including maize in some regions, for instance, Abruzzo, and in some spots 2,600 feet above

sea-level. And while, in Continental Italy, the vigorous winters suspend vegetation, in South Italy the groves of lemons and oranges and the pastures remain green, and many trees and shrubs are covered with leaves and flowers.

As for the animal kingdom, there are no species that have characteristics worthy of mention in these brief geographical outlines. Many centuries of history and the great number of inhabitants have reduced to a minimum the species of animals that are not useful to man. Agriculture is carried on in favorable regions; grazing in summer on the mountains, and in winter on the marine plains. Fishing is carried on extensively on the sea coasts, and cattle, swine, sheep, horses, silk-worms are raised in more or less abundance. Many species of fish are found in the Tyrrhenian Sea; among them are sardines and tunny-fish. There is also an industry in coral. The distribution of these various industries depends, of course, on the oro-hydrographic conditions.

Population.— The Italians form one people, and with very few exceptions speak one national language. But they present an extraordinary number of variations in character and physical type, as well as in dialect, which is a natural consequence of the varied regional and climatic conditions of the country, and of the many thousand years of historical changes, invasions, conquests, intermingling and separation and the various phases of civilization, out of which Italy of the present day has evolved. Before the Middle Ages, ancient history gives a record of the inhabitants of Italy as Iberi, Sicani, Siculi, Liguri, Veneti, Iapigi, Etruschi and the great family of the Italian people properly so-called: Umbri, Sabelli, Latini, Volsci, Oschi, and in the north the Galli, besides the Greek and Phœnician colonies of the south. Modern glottology finds traces of all these stocks in the division and differences of the present Italian dialects. Then came invasions and immigrations, small and large, of Germans, Arabs, Slavs, Spaniards, etc., at the beginning of the Middle Ages, and during the subsequent centuries; and as a last relic of these, there are found at the present day, within the kingdom, some isolated patches in the Alps, and in the Venetian foothills of the Alps, and in the high valleys of the Sesia and the Toce; Franco-provençals in the Piedmontese Alps; Slavs in the Julian Alps; Greeks, Albanians, Slavs and others in southern Italy and the islands. But taken altogether these colonies do not amount to-day to more than about 200,000 souls. Then again, this number is gradually decreasing with the multiplication of modern means of communication and with the increasing association between different districts. Further, the so-called "Compartimenti territoriali" (Piedmont, Liguria, Tuscany, Latium, etc.), which are more or less directly referable to transmitted historical divisions, have their *raison d'être* in a double order of facts, that is to say, in a combination marked with diversities inherent to the country, and in a condition of oro-hydrographic segregation more or less complete. Considered in their chief lines, it can be shown that they represent almost all not conventional divisions, but "geographical provinces." And we must here seek one of the most cogent reasons for this political division, on account of which Italy fought for so many centuries. When once the military and political valor of the ancient Romans united Italy it was one of their chief and most laborious and wisest tasks to prevent the segregation of the various races by their network of celebrated roads. And even yet, new Italy in its formation into a single state feels the imperious need of uniting and bringing into closer contact the various provinces of the kingdom by means of rapid communication by roads and railroads, and by the expenditure of a relatively large sum of money to do away with the natural inland barriers of the Apennines, by making roads across them at fully 15 points, with 15 different railroads, making furrows here and there through all the mountain system for long distances, also along its whole length, and enclosing the country as with a network of protection, with an immense circle of steel rails. Thus whilst the climatic and other geographical diversities remain unchanged, and give variety and a valuable stimulus to the various industries of Italy, modern civilization improves on nature by modifying the danger arising from segregation due to the natural formation of the geographical provinces, by promoting and cementing national unity.

In 1915 the population was 36,120,118; and that of the four greatest cities (1 Jan. 1915) was: Naples, 697,917; Milan, 663,059; Rome, 590,960, and Turin, 451,994.

Bibliography.— For a more profound study of the physical geography of Italy we recommend among others the following works: Marinelli, G., 'The Earth'; a popular treatise on universal geography (Milan). The fourth volume is entirely dedicated to Italy, part I, pp. 1–509, particularly to the physical geography. Fischer, T., 'The Italian Peninsula'; an essay on scientific chirography. First Italian translation revised and enlarged (Turin 1902, 1 vol., with map and illustrations). Both these works refer to others containing researches on special subjects.

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2. ITALIAN ARCHÆOLOGY. Italian archæology, from the remotest periods of human existence down to the Roman Age, presents a series of successive phases enclosed by a vast horizon. The archæological material, which is uniform or nearly so during the Stone Age, at the close of the latter, and at the beginning of the Metal Age, appears distinctly divided into regional groups. The people who produced it remaining in their own localities expressed their tendencies under varying influences and in different ways, as influenced by their local environment without, however, losing the fundamental racial characteristics which testify to their common origin. During the following age of metal these differences increase as waves pile up and mix with waves. To the difference in implements is added the divergence of funeral rites. In northern and middle Italy, cremation and the placing of the remains in a mortuary vase take the place of sepulchre; in other regions cremation appears at isolated points, while in others it is absent; all this indicating not only intensified commercial currents, but also that there was a real movement

of population. Caution is necessary in attributing differences of archæological material and of rites to immigrations of new people; these phenomena do not always coincide, sometimes they conflict with the spread of race and language. If for a given epoch we should color a map, using four different colors to show the districts in which are found similar material, analogous funeral rites, one race and one language, the four colors would not exactly cover one another. Nevertheless, if there were immigrations into Italy they occurred chiefly in the age of metal and the culmination of the movement was toward the end of the Bronze Age and at the beginning of the Iron Age. Two facts unite with the data supplied by implements and rites to prove that there was, in upper and middle Italy, an infiltration of peoples from the central regions of Europe: First, the presence in these parts of Italy of a different anthropological type with a rather large and round head, whereas in lower Italy the old Mediterranean type of the oblong, finely modeled cranium has remained almost unaltered. Second, the advance and then the predominance of the Aryan language, whereas the ancient Mediterranean race which occupied Italy and its islands at the end of the Stone Age had a non-Aryan language.

From the beginning of the Iron Age the differences between the different regions of Italy remain practically stationary as far as the ancient indigenous civilizations are concerned; but they soon became intensified and simplified by two conquests or civilization movements which divided Italy between them. These two movements came from the eastern basin of the Mediterranean. From the insular and peninsular countries which afterward constituted classic Greece, there came into southern Italy and into Sicily small successive waves of peoples, at first not yet Aryanized as to language and perhaps driven out from their old habitations by new invasions (in these people we can recognize the Pelasgians of tradition); then, peoples who corresponded more and more to the conception which we have of the classic Greek (a Mediterranean stock, Aryanized in language). The pre-Hellenic, proto-Hellenic and Hellenic peoples colonized chiefly the coast and some stretches of contiguous territory. A parallel movement was the establishment of Phœnician settlements, which were, however (except in a part of Sicily), covered up by the Grecian colonization, and are not of great importance as regards the Italian Peninsula. The Phœnicians contented themselves with trading with the latter.

The other immigration, which divided Italy with the Greeks, was that of the Etruscans — a people of Mediterranean stock and of non-Aryan language. They came across the sea from Asia Minor and, finding the coasts of southern Italy occupied as far as Cumæ, they crossed the Tiber and occupied the country to which they gave their name. From there, crossing the Apennines, they conquered the Æmilian plain as far as the Adriatic. Their influence branched out also into upper Italy, became extended to Latini and over Rome, to the citizens of which the Etruscans were masters in the liberal arts and in religion, even giving them a king. Finally even the most southern Greek coastal colonies felt their influence which asserted itself in the Campania of the interior by its systematizing work of changing old indigenous dwelling-places into regular cities with religious and military organizations, which rose to great importance and to vigorous life (Capua, Nola, Pompeii).

The intensification of the pre-Hellenic and Hellenic commercial currents into real colonization movements took place on the old foundation of the same very ancient Mediterranean stock. The newcomers were not far from their mother country in which the sons of their own progenitors continued to live and with which they liked to connect themselves, giving to their new home the name of Larger Greece *Μεγάλη Ἑλλας*. Essentially traders and navigators, the Greeks did not give much care to the organization of territory. All these circumstances were extremely unfavorable to the establishment by them of an Italian nationality, hence the indigenous population of the south and of Sicily in part underwent a rather superficial assimilation which fell at the first blow and in part relapsed into barbarism.

Very different were the conditions in middle Italy when the Etruscans reached it. Before they, in their turn, conquered it the region inhabited by the old Mediterranean stock had already been conquered by the Umbri, who had an Aryan language and European civilization; and the prehistoric Umbria, which was considerably larger than the region which has preserved the name, then underwent a sort of mediævalism, of transformation and of revival. For their part the Etruscans did not have a home country near at hand where their brothers continued to live and with which they could keep up an intercourse. Their motherland was far distant and the connecting links were broken so completely that even to-day it is not possible, except very generally, to identify their original home. For that very reason the Etruscans were much better prepared than the Greeks to regard Italy as their real home and to co-operate in developing a national spirit. But we should also mention the characteristics they show in the monuments which have come down to us. Profoundly religious, connoisseurs of art and excellent technicians, although not gifted with the sublime æsthetic sense toward which Greek art was tending, caring less for navigation and commerce than for organization of territory, the Etruscans got along better with the simple and rough Umbrians and conferred on them the dignity of a superior civilization, beginning with a true architecture, as shown in houses and tombs and the organization of a city and public and military works, up to a religion pregnant with doctrinal and cosmological content. One fact which had a great influence in this connection was that the Etruscans, unique perhaps among the Mediterranean stocks in this respect, had preserved primitive and homely customs; they honored the hearth and gloried in the maternal name, mentioning it in epigraphs, whereas the Greeks had inherited from the "Myceneans" the separation of the two sexes and the very inferior position of women. By this conjunction of favorable circumstances notwithstanding the different language, the Etruscans very soon forgot, or made others forget, that they were strangers; they amalgamated the indigenous elements and assisted in creating that Italic civilization with its sentiment of na-

tionality, in opposition to the Greek; a sentiment which still existed among the Roman conservatives at the end of the republic who regarded anything with a flavor of Greek as foreign and reprehensible. Without the Etruscans there would probably not have been a superior Italic civilization opposed to the Greek; there would have been only the contrast between a rudimentary and semi-barbaric civilization with one more advanced.

The Gallic dominion in the Cisalpine Gaul bounded the Etruscan power on the north and still further circumscribed it by descending into the Cispadana Gaul. There was without doubt a momentary return to a simpler and more primitive civilization in upper Italy, but it is not at all true that the Gauls did not manufacture their own pottery, metals and other implements; their civilization has merely been less studied because it was ruder; but in certain points its centres of production can be established.

But the Roman eagles were drawing near to the boundaries of Italy; they closed the vista opened up by Italian archæological material by restoring to uniformity the civilization of the peninsula and its products. Rome, the inheritor of the Etrusco-Italic national spirit, founded its power not so much on commerce and navigation as on the organization of territory, on the development of terrestrial communication, of public works and power and of military and political ordinances. Under the powerful hand of the ruler the old population became uniform in civilization and language. The old name of Italy, born in the extreme south of the peninsula, set up for a moment as the standard of the national spirit in rebellion against the leading city, is taken up by Rome, is carried as far as the Alps and remains through the centuries as the symbol of national unity.

In the following outline, necessarily condensed, an attempt will be made to give a more detailed idea of Italian archæology in the present stage of the study.

I. Stone Age. *A. Archæolithic.*— Besides the localities mentioned in an article by Mortille (Revue mens. de l'école d'anthrop. de Paris, 1891) on the diffusion in Italy of axe heads of the type of Chelles, it appears that these objects have been found in other places also. Still more recently they have been seen on the island of Capri (Bull. di paletn., ib. 1906), where, as in the black earth (*Terra nera*) of Venosa, they are found with bones of animals of an extinct species and precede the great conflagrations caused by the volcanoes of the region. On the spread of the so-called Monster and Campigny types (see Colini, ib., p. 203 et seq.) these stone implements had a large diffusion in Italy.

It is now certain that in the Quaternian Age dead bodies were placed in the caves of the *Balzi Rossi* (which although situated in Italy belong to the French sphere of influence), with rites which were still in use among the neolithites of western Liguria. (Consult Issel, in Bull. di paletnol. ib., 1906, p. 102).

B. Neolithic Period.— This age is characterized by stones which are polished and bored (hammers, axe-heads, studied principally by Colini) or finely retouched. Polished Italian axes are not usually of silican material, but the most ancient are of green rocks, later of various rocks. Green rock was for a time held to be exotic and a proof of the immigration of the neolithic people, but local strata of it are beginning to be found and in any case such proofs of immigration do not hold good, because it is much more easy for the object itself to have traveled from tribe to tribe as among modern savages. Besides, this epoch has a beautiful and solid pottery made by hand and burned over an open flame as continued to be the case during the prehistoric age down to the introduction of the pottery oven and of the wheel which came with the Hellenic and Etruscan influence. But the neolithic Italian pottery is not only more beautiful and more solid in form, it is also more rich in ornamentation, which phenomenon is found also outside of Italy. A class of this pottery, indubitably neolithic, although the descendants of its authors afterward possessed bronze, is better represented in southern Italy, especially in the grotto of Pertosa, near Salerno. The neolithic period of Sicily, on the other hand, admirably represented by the deposit at Stentinello near Syracuse, is connected in form and ornamentation rather with occidental development and with the pottery of the *dolmens*, as Pigorini has already shown in connection with the famous bell cup of Villafrati. Megalithic monuments are especially known in southern Italy and in the Italian islands.

The Italian neolithites lived in four ways: In grottoes; in fragile huts, the traces of which have been lost; in semi-subterranean huts (in which the part beneath the earth is found filled with human deposits, the so-called "hut remains"), and on pile structures. The arguments formerly advanced for distinguishing different peoples by the varying style of their dwelling-places no longer hold good, in view of the facts; at times, however, a difference of age may be so distinguished. The dead were buried in caverns or in open ditches, mostly in a doubled-up position, sometimes on a bed of ochre from which the bones became colored, and which led to the belief in the practise of scarifying; this is no longer admitted to-day.

II. Metal Age. *C. Æneolithic.*— The population which occupied Italy and the islands during the Neolithic Age still remained when it began to possess and to cast objects of copper and then of bronze, or rather of an imperfect alloy as are the oldest ones. The rites and customs remained in substance the same, only becoming more developed. This has been amply demonstrated in the profoundly scholarly monograph of Colini, 'Il Sepolcreto di Remedello e il periodo eneolitico in Italia.' It is noteworthy that in that epoch there were already sporadic cases of cremation, which shows how even primitive indigenous customs evolve and change without the intervention of new people. The singular position assumed by Sicily in this epoch is also worthy of note, with its typical small funeral grottoes cut in the rock and its bichromic pottery painted with linear ornaments of savage taste.

D. Age of Bronze.— For this epoch also we have a scholarly monograph by Colini in Vol. V of the 'Atti del Congresso Storico di Roma' (1904, p. 3, et seq., reprinted with figures in the Bull. di paletn. ib. 1903 et seq.). With full understanding of his subject the learned author shows that all the regions of the Italian Penin-

sula and the islands had their age of bronze with tools and with the evolution of a characteristic civilization, but which varied in different regions according to the different ethnical constitution of the inhabitants. In Sicily, as is shown by the splendid research work carried on and accurately described by Orsi, there is no doubt that the age of bronze was evolved without any intrusion of new ethnic elements, but by the superposition of related elements (Siculi), passing through the straits of Messina, upon the most ancient islanders of the same Mediterranean stock (Sicani), and it would have come about independently even without their aid. The Siculan age of bronze is particularly characterized by the multitude of funereal cells out of which lateral niches frequently open, by the introduction of certain architectonic principles, by weapons, instruments and ornaments of bronze of a characteristic style and by new commercial influences substituting "Mycenean" products for the pre-Mycenean which already appeared in the eneolithic period. Together with the facts of simple evolution, which would always have come about, there is a revolutionary one, that is, the sudden abandonment without decadence or decline of the singular bichromic eneolithic pottery and the brusque introduction of an achromic smooth pottery of an angular mould (imitation of metal), which almost instantly supplants the other. This fact, inexplicable by the simple theory of evolution, should be placed in connection with the historically certain event of the arrival of the Siculi in the island.

This opinion which the writer advanced (comp. 'L'Anthropologie,' 1897, p. 129 et seq.), and has held for some years, is in its turn confirmed by two facts: In southern Italy the archæological stratum with the characteristic bichromic pottery of the Sicilian eneolithic period is lacking; also the neolithic pottery with decorations, of the type of Butmir and of Knossos evolves in the Metal Age into an achromic pottery of angular mould. The characteristics of this pottery are the high, broad handles with an opening. They are lacking in the Siculan eneolithic period, but are found in the Siculan age of bronze; and what is more important, in types which represent a typological or chronological continuation of those of the peninsula and which belong to a more recent strata also as regards certain chronology and represent a stylization and geometrization, an exaggeration or an atrophization of the pure cave forms which persist in southern Italy.

In this lower part of the peninsula, to judge from the studies of those who, like Orsi, know its material and that of the large neighboring island from personal observation, there can be no doubt that the ethnic basis is identical with that of Sicily and that dwellings, graves and implements are to be attributed to the same very old Siculan people who had occupied the peninsula from time immemorial. In southern Italy, therefore, the connection with Sicily in civilization shows the influence of propinquity and not only the commercial one. The dwellings of Taranto, held to be analogous to the so-called *terremare* of Æmilia, in reality are not that, but are a Siculan village with houses or huts held up by piles planted in the ground, also surrounded in part by a stone wall continuation.

The neolithic period lasted tens of thousands of years; the tombs recently discovered belong to a very ancient age and show primitive types. The dwellings, on the contrary, begin (as at Pertosa) in the recent neolithic period contemporary with those of Knossos and of Butmir and end with the Mycenean period. The types of the vases of the dwellings of Taranto cannot be derived from those of the *terremare*, because they are older, as Brizio rightly observed.

Ascending the peninsula, there is found in middle Italy, especially in Latium and in Rome itself, at least from the end of the Bronze Age, as it were the meeting of two currents; on the one hand the partial persistence of the rite of sepulture and of similar types of implements, which are considerably more numerous than is generally believed; on the other the superposition of cremation and of certain new types or varieties.

In upper Italy, in which Æmilia may be included, we find cremation predominating. The theory according to which this rite was brought by a special invasion of pile dwellers of the age of bronze is founded on an observation, on a hypothetical explanation of the same and on a second hypothesis. The observation regards the difference between the material of the Eastern or Venetian dwellers and that of the Westerners; the hypothetical explanation is that this difference was caused by the coming of a new people; the second hypothesis is that this new people began rapidly to descend the peninsula, preserving their customary living on pile structures, even on terra firma, far from the lakes and becoming builders of the mound dwellings (*terremare*) of Æmilia. This theory has been opposed by Brizio in his 'Epoca preistorica' and practically the distinction between the Western and Eastern pile dwellings was asserted without sufficient reason.

E. Age of Iron.— In Sicily the character of the preceding age remains with a few modifications, with the decadence of indigenous industries and with the increase of commercial influences in which the proto-Greek element takes the place of the Mycenean. The same thing takes place in southern Italy of which the Campania has been studied in the last years more than other regions. Here, in two points, there have come to light new centres of prehistoric inhabitants who saw the dawn of Greek history and colonization and also in their funeral rites as in their local industries, restricted chiefly to pottery, reveal the persistence of relations with the prehistoric caves and with Sicily. The cemeteries of the valley of the Sarno are sufficiently enlightening in this respect, but much more important are the graves and the pre-Hellenic dwellings of Cumæ, which show us the origin of the Greek western colonies in a way very different from the conventional one, that of literary tradition and of pure history.

The rare and problematical traces of the Villanovian (Umbrian) civilization can point only to commerce. In middle Italy, especially in Latium, the traces of two ethnic elements still continue to be distinguishable, but in the end become confused with Etruscan influences and with those of Greek and Phœnician traders and the whole is under way to that happy fusion which gave us Rome. Æmilia and pre-

Etruscan Tuscany constituted the real sphere of Umbrian influence, whose largest centre was Bologna. For the classification of the Umbrian tombs of Bologna, for the traces of dwellings and for the celebrated deposit of S. Francesco, consult, in addition to the works of Brizio, the work of Montelius, entitled 'La civilization primitive en Italie.' An important centre of antiquity with close affinities to that of Bologna is at Este.

The general type of all these tombs is an excavation (*Pozzo*) at the bottom of which are collected the ashes covered by a cinerary urn (*cistola*), protected still further by an enclosure of stone slabs, or by a wall of small stones which cover the excavation, in which is also the funeral outlay. Altogether this civilization differs and diverges widely from that of the south and of the islands; it is less Mediterranean and more European.

F. The Pelasgians.— There is no doubt that before the colonization movement of the classic Greeks, of Aryan language, there came, especially into the Italian Peninsula, small waves of Oriental non-Aryan peoples; one of the last was that of the Messapi, who according to Herodotus come from Crete and who have left us documents in an incomprehensible language isolated from the other Italian dialects and standing alone except for reminiscences of style, partly Mycenean, which they preserve in their implements. The last, strongest and most surely Pelasgian was that of the Etruscans. The question as to whether the wall girdles, otherwise called Cyclopean, should be referred to the Pelasgians and as to what materials and people correspond with them, has not yet been answered. The excavations of Norba, which were loudly heralded as a discomfiture of the Pelasgophiles and which concluded by attributing the walls to the Romans, have in reality decided nothing. More conclusive were the excavations carried out by the writer in *Atena Lucana*, not so much because they succeeded in obtaining very positive results, as because through them it was shown that the Romans could not have constructed the walls. The material found there of the historic age goes back at least to the 7th or 6th century before the vulgar era and the prehistoric age is also represented; but the implements collected were few, poor and left many gaps.

III. Historic Age. *G. The Etruscans.*— Etruscan archæology deserves a separate article, but it is fairly well known through manuals of history, art and civilization. Here we will only mention that the theory of their descent from the Alps and of their ethnic unity with the so-called Italicans, is no more admitted; now the derivation of the Etruscans from Asia is recognized, together with the non-Aryan character of their language. Brizio has the merit of having proved this, but the credit of having reopened the question and co-ordinated it with more recent research is due to Modestov. A great progress in Etruscan studies is represented by the *Museo topografico dell'-Etruria* founded at Florence by Milani and described by him in a special illustrated publication which has the same title as the institute. Milani has published a remarkable collection of the principal monuments in the archæological museum in Florence with good plates, with an attempt at a religious explanation. To the most ancient Umbrian pozzo tombs with the rite of incineration are added the rich chamber tombs, with the rite of sepulture, with characteristic architecture, art and a directly imported industry, which the Etruscans developed in their new home, whereas the indigenous population progressed in its turn, but gradually fell under the influence of its rulers. A too violent reaction against the ingenuous exaggeration of the old archæologists, who too easily attributed everything to the Etruscans, fell into the opposite extreme of despoiling them of almost everything to attribute it to the Ionian Greeks. But now there is a tendency to return to the old standpoint; the important studies of Karo (in 'Studi e Materiali') return to the Etruscans the glory of the fine filigree and lace goldsmith work; we may also mention the studies of the writer on the origin of the Italic house whose first real architecture (which derives nothing from the hut of the age of iron, as Nissen believed,) it owes to the Etruscans.

The existence of Etruscans in the Campania was, a few years ago, denied by some archæologists, but the question was reopened by the writer, who attributed to them the production of the black ware (*bucchero*) which is peculiar to the interior of Campania in all the southern regions and is met only in Etruria; there was also found in old Capua an Etruscan inscription on terra-cotta and lastly in Pompeii an old column of Etruscan art, preceding the oldest houses of the city, which are of a non-Grecian character, and calcareous stone, and whose construction as well as the regular map of Pompeii are also attributed to Etruscan art.

H. The Greeks.— The Hellenic colonies of Sicily and Italy also deserve a special article, but they also are well known and are discussed in all manuals of ancient history, of art and of Greek civilization. The oldest colony appears to be Cumæ, which furnishes a geometric pottery more archaic than that of Sicily and in the foundation of which city the part taken by Æolian Kyme is confirmed.

The Greeks, as has been seen, occupied a place already inhabited by an indigenous population, as was also the practise of the Etruscans, and they organized it into the form of a city. Cumæ has furnished precious archæological material, which is now mostly collected in the National Museum at Naples and which is still largely unpublished.

For the Greek colonies of Sicily we have exhaustive works, due in large part to the activity of Orsi. After the volume of Cavallari and Holm on Syracuse, our knowledge of the necropoli of that city and of their material has been greatly augmented by the numerous researches of which Orsi has given an account in 'Notizie degli Scavi.' On Megara Hyblæa we have a very good and complete study by Cavallari and Orsi and others by Orsi about Kamarina (in 'Monum. dei Lincei'). But the other Sicilian colonies have been little studied; likewise the Italiote colonies, except now Taranto, which also was neglected for a long time. Among the most important monuments left by the Greeks of Italy and Sicily are without doubt the temples. Peculiar to southern Italy is the abundant production of decorated pottery, born under the Greek influence, but developed in large part in Italic cities or according to local spirit. Consult the writer's mono-

graph on 'Ceramica antica nell' Italia meridionale,' of which Mr. Walters has given a good summary in his 'History of Ancient Pottery.'

I. The Gauls.— The Gauls have been met with by the students of the Transpadana, of Venice, and of Æmilia and Picenum. But their implements, of which there are scanty remains, are not at all beautiful and are very little studied. We will mention only the works of Bianchetti on the sepultures of Ornavasso, of Castelfranco and of Brizio on various necropoli of Lombardy and of the provinces of Bologna and Ancona.

J. The Romans.— In unifying Italy, the Romans unified also its civilization and its products. The great artistic character of the monuments in which the Romans developed the national elements, inherited from the Etruscans, also taking up Greek elements, passed beyond the confines of Italy. These arts are above all architecture, historic and iconographic sculpture, mural and decorative painting (into which was transferred much of Greek and Hellenistic art), and mosaics, of a more specifically Alexandrine derivation, but to which, nevertheless, Roman artificers knew how to give an individual development and character. In their archæological material we can distinguish diversity of province and of fabric, but no longer different civilization and peoples.

A large part of our knowledge of the intimate life of the best Roman period is derived from Pompeii (q.v.), which, buried by an eruption of Vesuvius in 79 A.D., has preserved better than any other source the little implements of daily use, the circumstances surrounding their use and their application. A special article would be necessary to treat of Pompeii, but the place is so well known that a mere mention will be sufficient in this summary. A special importance attaches also to the topography and history of the city which was the great crucible in which were fused and from which were diffused all the elements which constituted Roman civilization. The most important of the finds recently made in the Forum are the pre-Romulean necropolis and the now celebrated stele with the inscription in which, after much hesitation and contradiction, a *lex regia* is now generally recognized.

K. The archæology of Sardinia deserves a separate treatment on account of its special character.

Traces of the Palæolithic Age have not yet been discovered in Sardinia. The neolithic period is connected with the civilization of the western basin of the Mediterranean, hence with the Sicilian and with that of the Italian Peninsula; likewise the eneolithic period to which must be attributed the *domus de janas* analogous to the oven grottoes of Sicily. An excavation recently completed by Taramelli at Anghelu Ruju, near Alghero (consult *Notizie degli Scavi,* 1904), not only shows us much better than before that period of prehistoric Sardinian archæology, but proves to us that the Sardinian eneolithic period is superior to the Sicilian, as regards its greater antiquity, the more notable progress and richness of its local industries, and its development of funeral architecture. It proves besides that the beautiful pottery of chalcolithic Sardinia is very closely connected with that of the megalithic monuments of France and Spain, without having any relationship to that of Sicily, which with its singular and wild ornamentation in two colors always remains more isolated and stands out as a distinct ethical individuality, taking the word in its historical rather than anthropological sense, because the race is the same. At the end of this epoch begins the civilization of the wall period (*nüraghes*) and of the "tombs of the giants," so typical of Sardinia and lasting without doubt many centuries, to come to a close at the time of the most ancient Phœnician colonization of the island. The more recent researches confirmed the opinion that the numerous and imposing Sardinian walls (*nüraghes*), which are not tombs, are fortified houses, often erected to guard passages which of themselves would attest to a period of greatness and power.

The discovery at Haghia Triada in Crete of large bronze tablets like those found some time ago in Sardinia at Serra Ilixi (comp. Bull. di paletn. 1904), gives occasion to mention the good services of the Italian mission in Crete to which are due noteworthy discoveries and full illustrations of them.

A worthy but hasty synopsis is the work of Pinza, 'Monumenti primitivi della Sardegna,' the conclusions of which should be corrected in the light of more recent discoveries.

But Sardinian archæology does not assume an individual aspect merely during the prehistoric age; it stands apart from that of Italy, even in the most ancient phases of the historical period. The superior and more advanced civilization of the Orient, the literary culture, are not represented either by the Etruscans or the Greeks, but by the Phœnicians; who did not put foot on the Italian Peninsula and managed to maintain themselves in opposition to the Greeks in a part of Sicily, although they certainly did not represent the preponderating element. The study of Sardinian Phœnician antiquity was neglected for a long time. In the year that the writer directed the excavations, he carried on researches on the site of the city of Nora, completing the data gathered by others, and gave the results of his studies in a monograph published in Volume XIV of the 'Monumenti dei Lincei.' In that he has tried to prove that the first colonization of Sardinia goes back to the eastern Phœnicians, and not to the Carthaginians, and, both by analyzing the connections with preceding, contemporary and subsequent civilizations, and by studying the primitive elements of Semitic culture and religion, he hopes to have established the basis for a historical synopsis of the Sardinian antiquity on a higher plane than any yet attempted.

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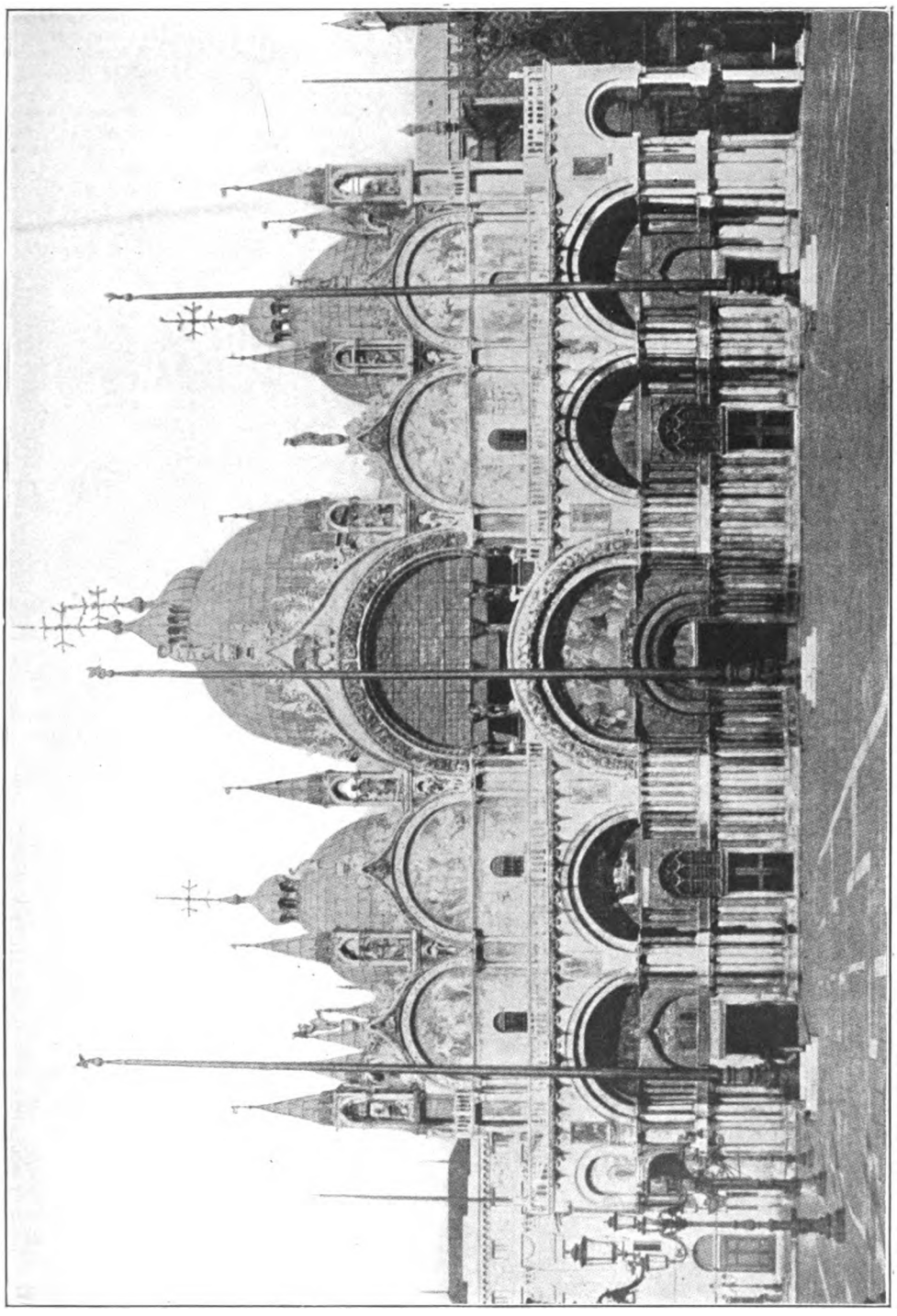
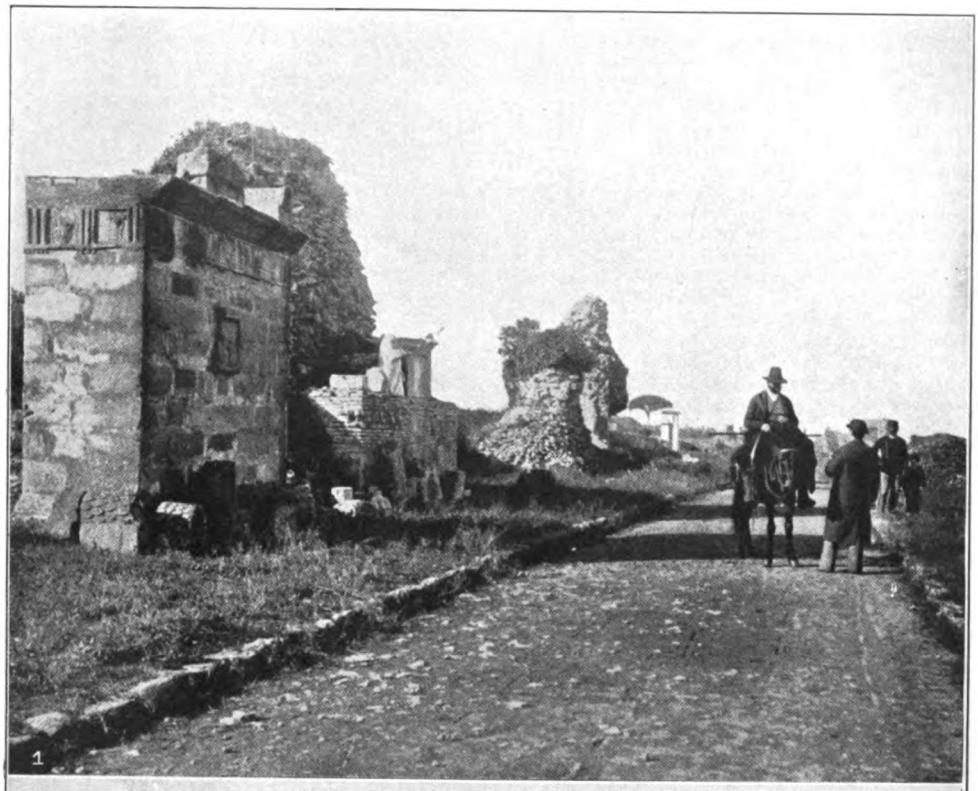
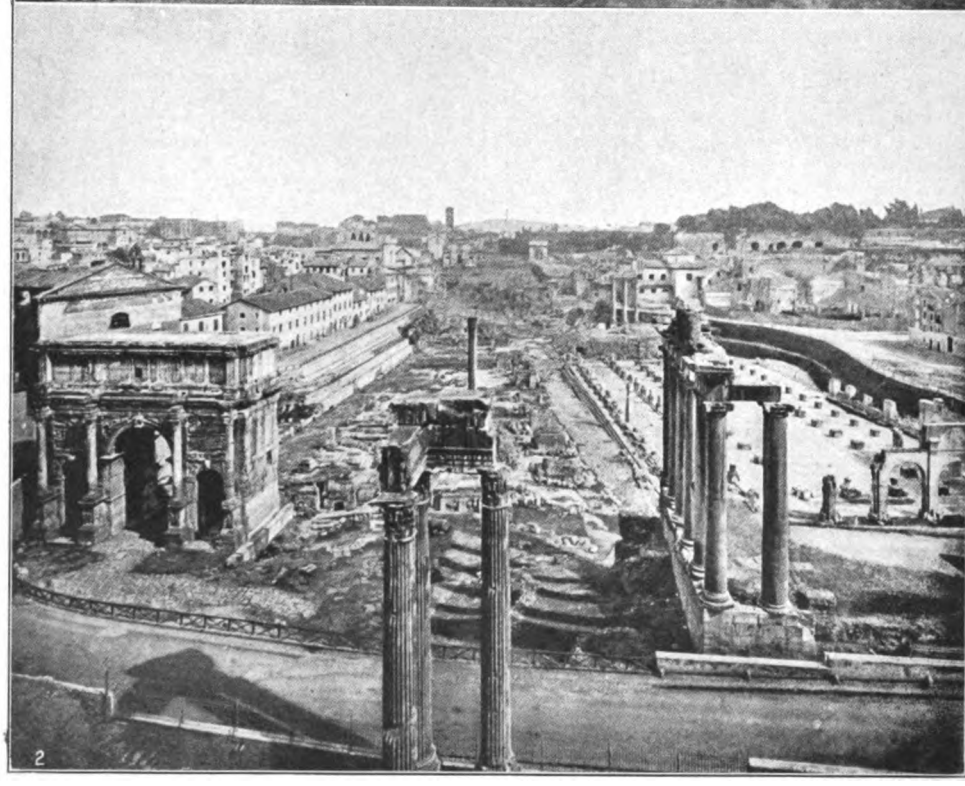
3. HISTORY OF THE MIDDLE AGES IN ITALY. In the Middle Ages Italy took the first rank in the history of civilization. The differences that arose under the Roman rule between the Greek Orient and the Latin Occident continued in the new historical period and included also the religious beliefs terminating in schism.

During the greater part of the Middle Ages, Italy was the centre of political life of the Western Empires, and in the 14th and 15th centuries became the centre of culture.



The Church of Saint Mark, Venice





1 The Appian Way, Rome

2 The Forum, Rome

The Middle Ages are generally supposed to begin with the year 476, because from this time till the reign of Charlemagne no Western prince held the imperial power. Nevertheless, during these three centuries the empire did not remain in the West. It was a unique institution even when, under Diocletian and his successors, it was represented by several associated princes. After 476 it was again represented in the Occident as a sovereign power by the resident prince at Constantinople, the legitimate heir of Romulus Augustulus, this unity manifesting itself above all in the uniformity of the laws and of the consulships, with their similar official designations of the year, as long as it lasted.

Odoacer assumed the title of king out of regard for the barbarian army of Italy, but ruled only as an imperial functionary. His residence was at Ravenna, where he maintained the Roman form of administration with its complex organization, and its rigorous separation of the military from the civil functions. He ceded Provence to the Visigoths, conquered Dalmatia and Sicily, granted a third of the landed property of the Italians to the barbarian soldiery, where they took possession and settled, and thus through the application of the principles of hospitality there arose among those people the institution of private landed property.

Odoacer's reign was a short one. Zenone sent him against the Ostrogoths under Theodoric, who desired fresh conquests. Theodoric acted as an imperial functionary. He substituted his own rule for that of Odoacer, resided at Ravenna, ceded to his soldiers the third of the Italian lands wherever the army was stationed. Thus continued the imperial sovereignty in ideal and judicial order; for the consulate continued, and as long as the Ostrogoth kings were in power, they published edicts and not laws, and an edict came within the limits of a magistrate's power, but they in reality ruled as independent sovereigns.

Theodoric endeavored to amalgamate the Goths and the Romans. He maintained, with slight alterations, the tributary and administrative system of the last years of the empire, and in compiling the edicts, obligatory on both peoples, he established a common and general legislation. But this policy failed, especially by reason of the diverse religions of the two nations. His failure to accomplish these ends inspired him to violence against the Romans. He was more fortunate in his external policy, for he restrained the power of Clodovicus, reconquered Provence, and maintained a moral hegemony over some of the Germanic kingdoms.

He was succeeded by Atalaric under the regency of his mother, Amalasunta, who desired to govern in accord with the emperor; but, when Atalaric died, the National party, opposed to the Romans, forced her to associate with her cousin, Theodatus, who had her assassinated, thus giving to Justinian an occasion to interfere in the affairs of Italy, and Belisarius, having conquered the Vandals, was commanded by the emperor to march against Theodatus, thus beginning a war that lasted 20 years, during which the kings Vitiges, Totila and Teia, and the Byzantine generals, Belisarius and Narses, were conspicuous by their valor. At length Italy passed under the direct jurisdiction of Justinian, who rehabilitated it by Pragmatic sanction. Provence was reconquered by the Franks.

The Greek domination in the whole peninsula lasted but a short time. In 568, or thereabout, the Lombards invaded Italy, followed by adventurers of various races, and they continued to extend their dominion, but could not conquer the whole peninsula. Italy lost its political unity and the Roman division of it into provinces. A Lombard kingdom was formed. Italy in part was divided into Duchies, of which later on Pavia was the capital and its cities, the residences of dukes and *gastaldii*, became the centres of the new administrative divisions. Italy continued to be in part a Byzantine province, governed by an exarch in Ravenna, and formed of scattered regions, almost all on the coast, which slowly reorganized as military circuits.

Meanwhile Gregory the Great gave to the Roman Church the priority over all the other churches of the Occident, and she thus rose in reality to be a universal institution. Gregory II defied the decree of Leo the Isaurian against the worship of images, and although the dissension did not go beyond the limits of a religious controversy and the popes remained loyal to the emperor, as they preferred his rule to that of the Lombards, the papacy became conscious of its power and under Zachary intermeddled in the nomination of the kings, consecrating the substitution of the dynasty of Pépin le Bref for that of the Merovingians.

The Lombard kings of most importance were Alboin, Autari, Agilulf, and then through the means of Theodolind began the conversion of the nation to Catholicism; — Rotari, who published the Edict, a territorial law binding for both conqueror and conquered; Liutprand, Rachi, Astolfus, Desiderius. The latter two strove bitterly with the popes; Astolfus occupied the Exarchate and threatened Rome. Stephen appealed to Pépin who confiscated Astolfus' conquests and gave them to the Church. In this way the Pope arrogated to himself the domination in Rome, in the Exarchate and in Pentapolis, in the name of the jurisdiction of Saint Peter. Desiderius quarreled with Adrian I who appealed to Charlemagne. The latter conquered the Lombard kingdom except Beneventum, and renewed Pépin's donation to the Church. The Lombard kingdom, however, maintained its individuality, its union with the kingdom of the Franks being only personal and dynastic.

Charlemagne waged many campaigns in Italy; and little by little he substituted Frankish counts and marquises for the Lombard dukes, giving them authority to preside at the tribunals and in the administration, and to proclaim a conscription in time of war. He obliged the dukes of Beneventum to recognize his sovereignty, and in the year 799 obtained from Pope Leo III the imperial crown, this dignity having lapsed in the Orient at the death of Constantine VI, and the Pope was only too anxious to assure to himself the protection of the ruler of what was now nearly the whole Occident. Thus the Catholic world had two universal institutions: one the papacy; the other, the new empire, consecrated by the Pope.

Under Charlemagne's weak successors the Carlovingian monarchy became divided into several kingdoms which were frequently at war be-

tween themselves. Charles the Fat reunited them, but in 887 he was deposed. The monarchy was then divided into five states, one of which was the feudal kingdom of Italy. With the weakening of the sovereign authority the local governments instituted by Charlemagne were transformed into hereditary principalities. Thus arose the feudal aristocracy, the chief cause of the weakness of these monarchies. The feudal kingdom of Italy was continually disturbed by this proud and rebellious nobility, until through the instrumentality of Otto I, in 952, it became a fief of the Geman crown. During this time the imperial throne was often vacant.

Meanwhile the duchy of Beneventum had been divided into the Lombard states of Beneventum, Salerno and Capua. The Greeks, through the machinations of the Arabs, lost Sicily, but reconquered a great part of Apulia; Naples, Gaeta and Amalfi had become autonomous duchies under the suzerainty of Byzantium. Rome was in a state of anarchy through local factions. Lacking imperial aid the papacy lost political authority. The islands of Venice became autonomous states under the suzerainty of Byzantium. Toward the end of the 7th century they formed a duchy which at the beginning of the 9th century had its capital at Rialto, an island that thus imposed its pre-eminence on the rest, and later took the name of Venice.

Otto I in the year 961 assumed the government of the Italian kingdom, and in 962 received the imperial crown at Rome. The Pope had need of protection against the adverse faction and the king rose to the highest political supremacy. The coronation with the iron crown — a custom introduced by Berengarius I — and the coronation as emperor became from thenceforth essential, consequent and complementary to the title of king of Germany; but the title to universal political supremacy came to the emperor through the Pontifical consecration, and this stirred up bitter strife in subsequent times.

The policy of the House of Saxony (Otto I, II and III, and Henry II) toward Italy was determined by three aims: to weaken the power of the feudal laity by placing it in opposition with the feudal ecclesiasticism; to establish the sovereignty over Rome by making the pontiff a vassal; to conquer southern Italy. With the first was associated the granting of the rights of supremacy and administration to certain bishops; hence the temporal jurisdiction over cities and its consequent restriction of the power of the count, which power was thus restricted to the county or state, and sometimes this episcopal jurisdiction extended to the whole county, and thus its limits coincided with those of the spiritual jurisdiction. As for Rome, its authority was uncertain, as it varied according to the power of the emperor; and in southern Italy the expeditions sent thither had been unsuccessful. The succession of Henry II in Italy was contested vainly by Arduin, assisted by the feudal secular party.

The House of Franconia succeeded the House of Saxony, in the person of four princes, Conrad II, Henry III, IV, V. Conrad II placed the minor feudal secular party in opposition to the feudal ecclesiastical party, granting to the former the right of heredity and the inalienability of tenure, by this means strengthening the middle ranks and decreasing the power of the great feudal ecclesiastical and secular parties. During the minority of Henry IV (through the efforts of Hildebrand) the Church began its emancipation from subjugation to the empire, and rendered itself independent of the imperial power and of the civil factions, by entrusting the election of the Pope to the College of Cardinals.

When Hildebrand became Pope, Gregory VII instituted a political theocracy and formulated the principle that the Pontificate held supremacy over the empire, and consequently over all Catholic powers, spiritual and temporal; and as Henry IV pursued the traditional policy of the emperors, which was in direct contradiction to that of the Pope, there arose between the two institutions the most characteristic contest of the Middle Ages. Then it took form in the question of ecclesiastical investiture, for the Pope would not grant to the secular princes this concession. This contest lasted during the reigns of Henry IV and Henry V, and came to an end at the Concordat of Worms, which did not determine the chief question — which of the two powers was supreme — but only the accessory question of investiture, establishing exclusive right of the Pope to spiritual investiture, and that of the king to temporal investiture.

These dissensions were advantageous to the Lombard cities. Owing to the comfortable, peaceful life they enjoyed because of the reconstruction of the walls, and the somewhat mild rule of the episcopal government, their population increased in the 10th and 11th centuries, and the middle ranks, whose party had been strengthened by Conrad II, formed new social classes, which resumed the profession of arms. During the contest for the rights of investiture the urban aristocracy, alone, or combined with the wealthier portion of the bourgeoisie, acquired the political rights of the local authorities. Thus arose a new civic order, the Commonalty, who attained the position of consuls and the *consilia*. But all this was done without the sanction of the sovereign, and therefore was not as yet a legitimate institution.

Meanwhile, in southern Italy, in the 11th century, arose the Norman principalities of Drengot and Altavilla. These, under Robert Guiscard and Roger, took Apulia and Calabria from Byzantium, Sicily from the Arabs, subjected Salerno and Benevento, and in order to legitimize their conquests received investiture from the Church. Roger II completed the conquests by the subjugation of all the other states of southern Italy and of Abruzzi, and obliged the popes to recognize his royal title.

With the fall of the House of Franconia there arose in Germany a dynastic contest between the Guelfs (House of Bavaria) and the Ghibellines (House of Suabia) for the succession to the throne. Lothair of Saxony succeeded Henry V, then came Conrad of Franconia, then Frederick Barbarossa. These wished to recover their rights as kings of Italy and as emperors; whence their contest with the Commonalty of upper Italy who formed, in defense of their autonomous authority, the first Lombard League, and with Pope Alexander III — for at that time, two popes having been elected by two parties in the College of Cardinals, King Frederick thought he had the right to suppress the schism and thus he reopened the question of

supremacy between Pope and emperor. He made peace with the Pope at Venice in 1177, but even then the only question settled was that of the legitimacy of Alexander. He came to an agreement with the Lombard League at Constance in 1183, and in this way the emperor recognized the autonomous authority of the Commonalty with the reservation to the sovereign of the right of investiture of consuls and the right of appellate jurisdiction. The Altavilla family being extinct, Henry, son of Barbarossa, obtained the throne of Sicily by law of descent; at the death of his father succeeded him, but died in 1197, leaving a son four years old, the future Frederick II.

In 1198 Innocent III rose to the papacy and resumed the policy of Gregory VII, marking the apogee of theocracy. The Guelfs and Ghibellines fought for the succession in Germany; the former being victorious under Otto IV, assisted by the Pope. But the usual dissensions arose between Otto and Innocent, the Pope placing the king of Sicily, Frederick, in opposition to the emperor. Frederick was victorious and obtained the imperial crown from Honorius III.

The Commonalty, meanwhile, had become almost the chief political party in upper and central Italy; the counts of Savoy, the marquises of Lunigiana and Montferrat and some other princes being the few that remained of the feudal party. The rights reserved to the sovereign by the Treaty of Constance were already denied; the Commonalty had become an independent republic. It extended its territory to the smaller neighboring communes — which it treated as subjects — to the rural communes and to the feudal proprietors of the country, obliging them to reside temporarily in the city.

Then there arose in the Commonalty new factions with the ancient name of Guelfs and Ghibellines, but impelled by local interest. The conquered feudality and the increasing power of the lower orders took part in these discords, but neither side gained a definite victory. The economic condition being thus imperilled by the instability of the government and continual wars, the idea was formed of substituting for the consuls a governor, *potestas*, of the order of cavaliers, chosen from other cities and foreign to the local factions. This was accomplished by degrees. At first by an unusual method — suspension of the consulate; then, in the first 10 years of the 3d century, by stable and regular method.

The new provision proved inefficacious, because the new authorities lacked the material strength necessary to overcome the factions. Thus sometimes a governor was drawn into their discords; and the people formed in several cities a commune of their own, with a captain of the people at its head. Under similar conditions, a party requires unity of action and one ruler. There was at the head of this one a leader, of an illustrious house, who sometimes deserted his own class to defend that of the people. Thus, the factions became identified with their head, and the dissensions between the two parties became dissensions between rival houses. When the head of the triumphant faction, who might also be the mayor himself or the captain of the people, held an unlimited tenure of the urban authority, there should be a new government — the *signoria*, who represented a necessary consequence of the new political and social conditions of the Commune. They do not represent a special official but the sum of the political power of the government. The first *signoria* arose in the latter half of the 3d century, in the form of a provisional dictatorship bound to the interests of the faction; later on, they became more stable, for the people had lost the consciousness of their rights, and, by the introduction of a mercenary soldiery, the practice of arms; and also owing to the fact that the *signoria* promoted the interests of their own people.

Frederick II ruled according to Barbarossa's methods and consequently the dissensions with the papacy and the Communes led to the formation of a second Lombard League. The war was ended in 1250 through the death of the emperor, and without any treaty. The Italian cities maintained their independence. The imperial power remained vacant until 1312, in which year it was resumed by Henry VII, but it had become a mere shadow of its former supremacy, an honorary position conferred on the king of Germany after his coronation at Rome. The papacy took from the last Suabian princes (Conrad and Manfred) the kingdom of Sicily in order to bestow it on Charles of Anjou, who was not successful in his contest with the empire; thus even the excellent mind of Boniface VIII had not the power to re-establish the theocracy, now quite incompatible with the intellectual and moral development of the laity. By degrees in the political order the papacy was transformed into an elective principality, restricted to one portion of Italy.

After this period the history of mediæval Italy became the history of its particular states and should be studied separately in separate articles. Here the history is only treated of as a whole.

The popes, not feeling secure in Rome, moved the Holy See to Avignon. On the re-establishment of the pontifical authority by Albornoz into the Ecclesiastical State, they returned, but the Western schisms weakened their authority. At length they took direct and real possession of the Roman Commune — which became an administrative entity — and exercised an uncertain sovereignty in the other portion of the Pontifical states.

The kingdom of Sicily, their fief, by the war of the Sicilian Vespers was divided into two kingdoms: Sicily under the kings of Aragon and Naples under the rule of the line of Anjou; then under the Durazzo; and lastly, under Alfonso of Aragon, who left Sardinia, Sicily and Aragon to his brother John; Naples to his natural son Ferdinand. Genoa, mistress of Corsica, destroyed the naval power of Pisa, and for its own commerical interests waged a bitter war against Venice; after this being weakened by internal discords, she passed under the protectorate of Milan, or of France. Florence conquered Arezzo, Pistoia and Pisa. In 1400 the Medici, without any title, or external mark of authority, became the arbiters of the Commune. In Tuscany the *signorie* insinuated themselves like a sporadic growth; and the Commune continued as before in Florence, Siena and Lucca. Venice, mistress of the Adriatic through the domination of Istria and Dalmatia, extended her dominion into the Orient by the Fourth Crusade, and in the Occident her conquests in-

cluded all Venetia and part of Lombardy. In upper Italy the "higher signoria" placed the "minor signoria" under subjection. The princely family of Visconti arose in Milan and conquered almost all Lombardy, and for a time other regions, and in 1395 obtained the title of dukes. When the Visconti family was extinct, Milan was ruled by the Ambrosian Republic; then she again became a dukedom under the Sforzas. The House of Savoy extended its dominion in Italy as far as the Sesia, and under Amadeus VIII, in 1416, rose to the ducal dignity. All these states, although prosperous in respect to political economy and culture, were weak on account of military and institutional drawbacks which finally led to their decadence in modern times.

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4. THE RENAISSANCE IN ITALY (14TH TO 16TH CENTURIES). Historical Introduction.— Chronologically considered Italian history from 1300 to 1599 may be divided into the Age of the Despots, the Age of Invasions and the Spanish-Austrian Ascendency, and the beginning of the 14th century witnessed the bitter struggle between Guelfic democracy and faithfulness to the Pope arrayed against Ghibelline aristocracy and loyalty to the emperor. Every Italian city, every hamlet, felt the strife. Every city was divided against itself and there could be no tranquillity until one-half of the citizens had driven the other half into exile, while from these battlements floated the banners of the partisans of the empire and from those the banners of the partisans of the Church. Soon the captains on each side, men of noble families experienced in war, took the lead in the struggle and finally became masters of the cities. The Estensi made themselves lords of Ferrara, the Torriani masters of Milan, the Della Scala dynasty arose in Verona and the Malatestas at Rimini. In Tuscany the strongly entrenched Guelf party long held the nobles in check, and for a time the Communes remained free from hereditary masters. But wherever they obtained a foothold these tyrants annihilated both parties for the sake of peace and their own advantage. The tyrant won favor by leveling down the classes and favoring the multitude. Italians tiring of the fury of these civil wars gradually settled down and turned to home comforts, arts and literature, content to pay foreign mercenaries and adventurers to do their fighting for them. These mercenary troops hired out to the highest bidder and sometimes fought alternately against and in defense of the same city. After 1350 these foreign mercenary soldiers were supplanted by the Italian mercenary, and Alberico da Barbiano, a nobleman of Romagna, formed the first exclusively Italian company. Henceforth Italian battles were fought by Italian paid troops under Italian generals (Condottieri). But these soldiers were not patriotic; they sold their swords for money and fought for the highest bidder. Naturally they were not anxious to die or even to kill in a cause in which they had no interest, and battles became almost bloodless and diplomacy and skill were the requisites of victory rather than courage. Intrigue and treachery were rife and military vigor ceased to exist in Italy.

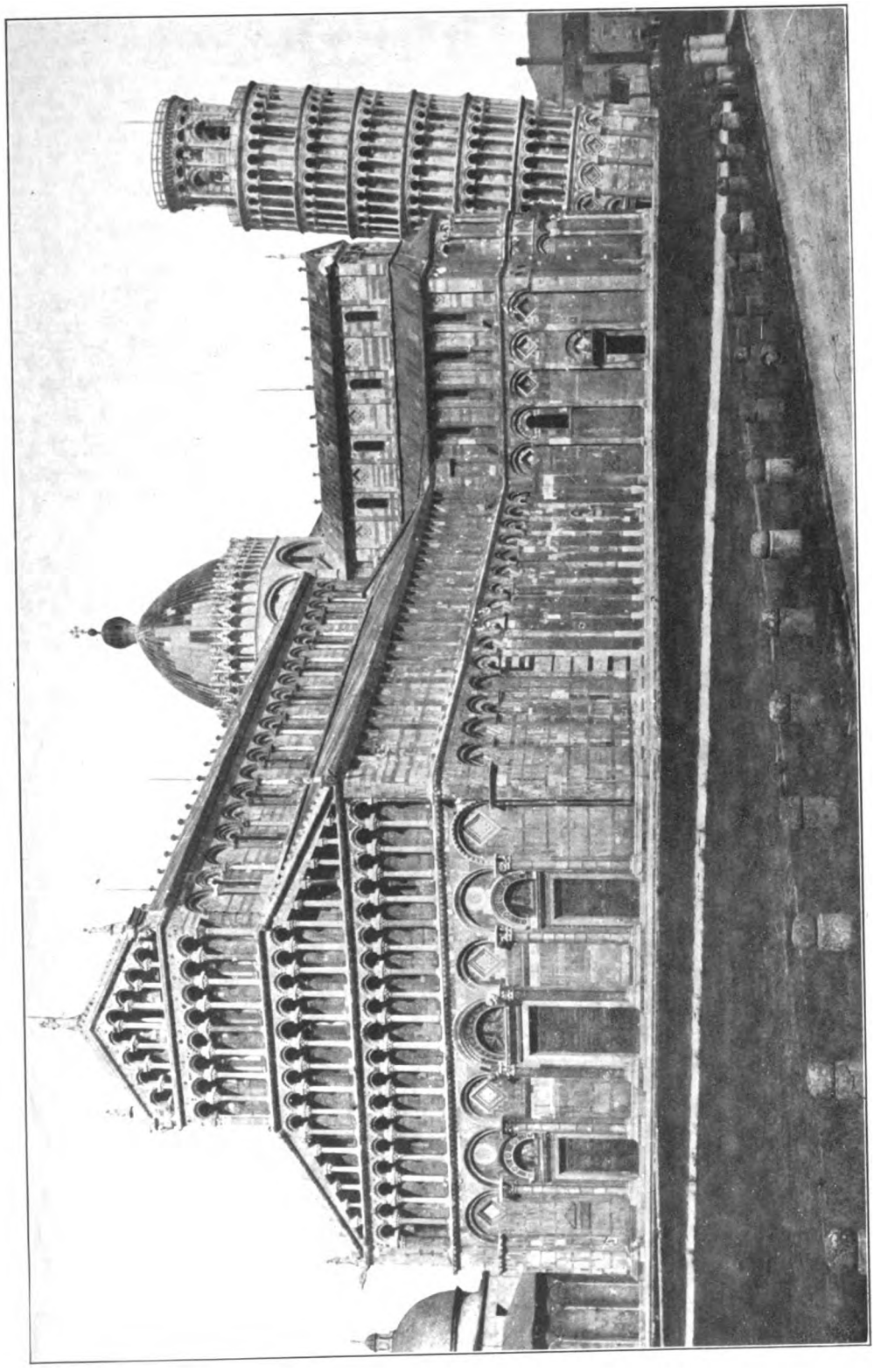
Between 1305 and 1447 five great powers were established in the Peninsula: The papacy, the republics of Venice and Florence, the duchy of Milan and the kingdom of Naples. In southern Italy, Joan, the childless wife of four husbands, succeeded her grandfather in the kingdom in 1343 and was murdered in 1382 by Charles of Durazzo — who reigned five years. He was followed by his son Ladislaus in 1387 and by his daughter Joan II in 1414, and in 1435 Alfonso (called the Magnanimous) combined for the first time since 1282 the crowns of Sicily and Naples. The 23 years of Alfonso's reign were the most splendid in South Italian history. The greatness of the Visconti family, dukes of Milan, dates from John, archbishop and lord of Milan, who died in 1354, and after a succession of incompetent and soon assassinated aspirants for the throne in 1378 Gian Galeazzo, his son, became duke and the most powerful and richest of the Italian despots. He pushed his dominion to the verge of Venice, subjugated Lombardy and attacked Tuscany, when suddenly he was cut short by the plague in 1402.

After the expulsion of the Duke of Athens in 1343 and the great plague of 1348 the common people of Florence rose against the merchant princes, and the necessities of war and of state soon placed Florence in the power of an oligarchy, headed by the great Albizzi family; Pisa was enslaved and Florence gained access to the sea. But the Medici gradually gathered strength and in 1433 came to open strife with the Albizzi and finally won.

When the popes settled in Avignon they lost their position as Italian rulers, but when Gregory XI returned to Rome and when Urban VI, elected 1378, put an end to the exile, the popes again became Italian sovereigns.

Martin V (1417–31) and Eugenius IV (1431–47) resided principally in Florence, but Nicholas V before his death in 1455 had firmly established the papacy in its temporal power.

Through the Middle Ages it had been the policy of Venice to refrain from conquest on the Italian mainland, and the first important entrance of Venice into Italian affairs was when in 1336 the republics of Florence and Venice formed an alliance against Mastino della Scala; and from 1352 to 1381 Venice and Genoa contested the supremacy of the Mediterranean, when Venice finally, though after many reverses, was victorious. In 1406 Venice added



Cathedral of Pisa and the Leaning Tower

Verona, Vicenza and Padua to her possessions, and during the long Dogeship of Francesco Foscari (1423–57) attained the height of her prosperity.

The year 1492, when Lorenzo Medici died, opened for Italy the age of invasions. Soon Spanish, German and French armies hastened to occupy her territory. Each petty Italian potentate strove for his own private advantage and there was no united resistance to the invaders. Though Rome and Florence rejoiced, the election of Leo X as Pope in 1513 brought no repose to Italy, and in 1527 occurred the famous sack of Rome by German and Spanish soldiers. But there was a great emperor, Charles V, and he in 1529 entered Italy and received the imperial crown in Bologna and achieved the conquest of the entire peninsula, and from 1530 to 1796 Italy ceased to have a history of her own.— ED.

THE ITALIAN RENAISSANCE

To the most genial of the great events recorded by history since the age of Augustus was given the expressive name of Renaissance. Born of a profound intellectual movement, which aroused throughout almost all Europe a love for and research into classical antiquity, the Renaissance rendered human thought active and paved the way for modern civilization and culture. Except in the Middle Ages the study of the Classics had never been less intellectually understood than at the beginning of this period. Religion, art and literature were all in a state of transition. Gradually Europe shook off the night of the Dark Ages and rebelled against their gloom. It was a beneficent movement, though sometimes in drinking deep draughts from these cups of classic learning, of pleasure and of freedom from superstition and ignorance, these drinkers became inebriated with the strong wine. The long duration of this transition constituted the Age of Renaissance, the 14th, 15th and 16th centuries — an age which, according to the common acceptation, was no longer mediæval, and not yet modern. It had its own peculiar characteristics, resembling in some respects the later Alexandrine Era; and in others, the splendid Age of Pericles; and it was distinguished by a marvelous activity in the world of letters and art, and in the development of universal genius and of heroic women, or *viragines*, as they were called.

Famous names are exceptionally numerous, and the importance of each increases the difficulty of making a choice and causes confusion in summing up results.

Add to this the pre-eminently individualistic character of the Renaissance, due to its origin; the intricacies of greater and lesser warlike undertakings, tumults of the people, the bloody greed of the princely families, papal strife, religious discords and contests, and one may form some idea of the obstacles overcome.

The causes which impelled these seekers to look to the past for the motives and the means of progress were many and diverse. The defects of actual civilization were apparent and the natural evolution of ideas revealed to human reason a new point of view from which to contemplate the varied phenomena of the visible and of the invisible world. As the 13th century drew near, the imminence of antiquity made itself more constantly felt. This revival was marked by the unveiling of the human form, Niccolo Pisano, in a very decided manner through sculpture; the author whoever he may be, of the 'Carmina Burana'; Cerminate, Albertino, Uzzato and other literary contemporaries of Alighieri (1263–1321) carried forward the movement; as did also the masters who inspired Dante and Petrarch. A debt is also due to the rhetoricians and scientists of Byzantium and to the Hellenists of Sicily and Calabria, whence came Bernard Barlaam who prompted Petrarch and Boccaccio to undertake the study of Greek.

We now come to Dante. The political and religious ideals of Dante Alighieri are almost identical with those of Petrarch. The art which the most celebrated poet displayed ('Purgatorio XII') belongs to another age, and possibly he got his inspiration from the columns of Rome and the sarcophagi of Pisa and Florence. No one observed and felt nature more than he did, and what he said about it came with the meaning of oracular thought; he loved fame, sought solitude, individualized himself; a virtue and attributes, these, which, combined, distinguished the man of the Renaissance from the man of the Middle Ages. Besides Beatrice, Alighieri had as a guide Virgil, and, occasionally, Statius; Guido Cavalacanti was his friend whose doubts or convictions he shared in the nights when, wandering through the dense forests, he had not yet left the course from which none ever came out alive. Separated from the pleasing and cold severity of the schools, Dante belonged to the Renaissance. But with him it has not the graceful coloring, almost like the breath of dawn, which already began to tinge all literature — the culture of the human race. This was made evident for the first time in the life and in the works of Petrarch, the father of Humanism, who sang the praises of Laura. Since Petrarch made his appearance, or, to fix the date more definitely, from his sojourn in Rome in the year 1337 until the time of Queen Elizabeth (1558–1603), Humanism and Renaissance have been more or less synonymous. Some of those who followed the movement were realists; but while the philologist has blazed the path by which we penetrate into the treasure-house of antiquity, and become acquainted with its principal actors and rulers, he is a Humanist per se.

The intellectual culture of the newly awakened civilization began after Petrarch had abandoned his scholastic methods of reasoning and the Dantesque scourge made use of ridicule to undo scholastics, astrologers, physicians and other charlatans, and placed the ignored Plato above the dominant Aristotle. And it did not stop here; Florence, Arezzo, Bologna, Ferrara, Venice, became also the seats of the Renaissance. At Naples, the king of preachers, converted by Petrarch; in Milan, the Archbishop Giovanni Visconti, his host; in Piacenza, Mantua, Padua, Verona, the da Correggio, the Gonzaga, the Da Carrara, the Della Scala, friends of Petrarch; in Avignon, popes not indifferent to the new philosophy, his generous admirers, formed the first nucleus of that company of Mæcenates of the Renaissance, numerous even in the 14th century, innumerable in the succeeding century.

Already the movement was becoming ever

more intensified; little by little the faint voice of the Classics was made more audible, and the ruins uttered their words, and the treasures were brought forth from the cloisters and churches. At the end almost of the 1st century of Humanism (about 1414), those persons who were only moderately cultured were already animated by the spirit of the new age, and classical culture had become an indispensable requisite to all who loved civilized society.

In the middle of the 14th century all minds were so well disposed that the design of Cola di Rienzi, so nobly conceived, seemed feasible. In Italy, Humanism had from the beginning patriotic characteristics. It is worthy of note that precisely in the 14th century there arose in Sicily a Latin faction in opposition to a foreign faction — the Catalana; Alberigo da Barbiano with an Italian character in a company of adventurers till then foreigners. The whole of Italy, either by money or by peaceful and unopposed usurpation, acquired political independence. Humanism, meanwhile, invaded the pontifical domain; first in Avignon, with the friends of Petrarch — Zanobi da Strada and Francesco Bruni; thence (when the schism was almost at an end), in Rome, where it soon mastered the papal secretary. In Florence and Bologna, with the Visconti and the Estensi, and all through the too numerous states of the Peninsula, convents, bishoprics and universities with more or less caution opened their gates to Humanism. At the time of the Council of Constance (1414–18) the Renaissance received another impulse from the many and happy discoveries of Poggio, and subsequently from those of other unwearying searches of the Codices. They filled up deplorable gaps and improved our knowledge of classical civilization. The Humanists of the recent school diffused the knowledge of Greek civilization from the rostrum, searched for, guarded and preserved Greek *Codici;* excavations and travel enriched with inscriptions and the results of precious labor the museums which were then being established. Ciriaco Anconitano and Aurispa da Noto made themselves famous; the former by his collection of inscriptions, and the latter by his ferreting out of manuscripts; while Flavio Biondo, of Forlì, with Poggio, the Florentine, restored archæology. Then for the second time the favor of princes and republics, of universities, cardinals, magnates was sought in order to obtain the rarest antiquities, the best manuscripts.

In 1447 Humanism issued triumphant, amid universal plaudits and rejoicing, in the very chair of Saint Peter (Tommaso Parentucelli, Nicholas V). In 1458, the poet, whom an emperor had crowned with laurel, assumed the name of Pius II (Enea Silvio Piccolomini). In the 15th century it had, besides the popes', the splendid protection of Alfonso the Magnanimous, of the Estensi, the Sforzas, the Malatestas, the Gonzagas and the Montefeltros; but at the head of them all stood Cosimo de' Medici, and Lorenzo de' Medici the Magnificent, who were the most sincere lovers of Humanism.

At the very time when the students of moral science approached the thought of the classics, the artists demanded of antiquity the secret by which they might produce artificially the fascination which the beauty of nature exercises over the human mind. Although their attempts were not always successful they arrived at the first transformation of mediæval art, which is distinguished by the glorious names of Donatello, Mantegna, Leon Battista Alberti. All the artistic manifestations of human sentiment became modified, from the greatest to the least. There is the Humanistic literature and the literature of the Renaissance. At this time, Humanism had reached its apex. Humanism brought discord into the camp of the Latinists. All minds were partisans of Plato or Aristotle. At Padua, Averroism began to revive. The Middle Ages also seemed about to revive. The orators became rhetoricians; writers sometimes became awkward imitators; canvases and walls became peopled with fauns; and the philosophers in reviving the forms of ceremonies no longer understood made themselves an object of ridicule to the Humanists themselves. The reaction came, and even before Savonarola planned his Catholic reform other men in the Church had set out to fight the spirit of the Renaissance, which now entrenched on the very foundations of the religion of which they were the ministers. At the same time sincere Humanists reacted not so much against the Boccaccio sincerity as against the obscurity which never was, and never can be, the aim of any true art.

The need was felt of new fields outside of the trodden paths. The broad philosophy of the Florentine Academy in reconciling classicism and Christianity was one of the most characteristic examples of this moral necessity. Other philologists began to explore the Semitic literature; they studied Hebrew and Arabic. Contemporaneously, the Italian language, at once the child and the means of civilization, became reinvigorated, and resumed the position that the ages had awarded it. Finally, Pico della Mirandola formulated the new Norm (program) affirming the rights of science, and the necessity of learning to know man in all the manifestations of his thought — the thought of the schools, which Humanism had overthrown. On this point the action of the revival was logical and complete; eclectic modern thought was born; a new era commenced. We are witnessing the discovery of a new world.

Undoubtedly classical thought injured the religious fabric of Christianity in the minds of cultured people; but the new thought did not renounce the virtue of Christian morality. It is strange that the fact has not been taken into account that in Italy the only persons who were interested in Grace and Justification were those very Humanists of the 16th century, and the legitimate descendants of the Humanists of the 15th century. And in the very centres of the first period of Humanism those philologists who apparently enjoyed gossip and pleasure were troubled by the same doubts as ourselves, which like great breakers dash here and there, from pole to pole. The two or three Obediences; the deposition, the arrest and the condemnation of a fugitive Pope; the long contest between the Council and the Pope, while they attacked the ecclesiastical question and forced the potentates of the Catholic world to a line of defense, placed the thinkers of the day in the identical conditions in which modern thinkers are placed by victorious science. That is why the Humanists faced the same questions which to-day preoccupy mankind. In their writings breathes the modern thought, and the

Renaissance has for half a century attracted the special attention of students who, when they have collected all that has been published regarding that period, will have a rich and precious library.

The action of Humanism was beneficial in other ways. Many ills for which it is held responsible were the effect of very remote causes; and the Renaissance, in which Humanism played so large a part, is one of the glorious victories of civilization. To the lasting conquests that the present age owes to the age of the Renaissance must be added another, which is that science at that period entered the path which has led it to the wonderful discoveries of our times. The study of anatomy first obtained a secure footing in the school of Bologna. In Florence, Toscanelli paved the way for the triumph of Christopher Columbus in the very year in which the Portuguese discovered the African coast. Navigation became a science, opened the unexplored ocean, and Europe became the watch-tower of the civilization of the world. Meanwhile, independently of Humanism, but always in this 15th century of its activity, printing began to diffuse knowledge and to become the most efficacious means of promoting the brotherhood of humanity! See RENAISSANCE.

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5. ITALIAN MODERN HISTORY (1492–1815). Foreign Intervention (1492–1530).— The great Italian historian, Francesco Guicciardini (1483–1540), begins the history of his time by declaring that Italy was never so prosperous as toward 1492. Certainly the economic and intellectual condition of the Italian people was then far superior to that of the rest of Europe; but they became weak from lack of unity. Whilst France and Spain organized powerful kingdoms, Italy remained divided into a number of states, none of which was strong enough to unite to itself the scattered portions of the peninsula, though each was sufficiently strong to hinder another from carrying out the great work of unification. Italian policy at that time consisted in a continued series of combinations to maintain a kind of equilibrium, always difficult and unstable, between the five large states of the peninsula, Milan, Venetia, Florence, Rome and Naples.

The lord of Florence, "Lorenzo the Magnificent," specially distinguished himself among his contemporaries by the great tact with which he prevented the breaking out of discords among various Italian princes; but he died in 1492 and at his death the political equilibrium was suddenly disturbed.

The first dissensions arose between the court of Milan and that of Naples. Then the young king of France, Charles VIII, who as heir of the House of Anjou — the eternal rival of the House of Aragon in Naples — had a right to the Neapolitan crown, descended on Italy to conquer it (1494). He crossed the peninsula without meeting any opposition, except at Florence, where Pier Capponi with his energetic words of defiance induced the French king to modify his demands. The Aragonese in Naples did not know how to organize a serious resistance; and on 22 Feb. 1495, Charles VIII, without opposition, made his solemn entry into Naples. The extraordinary ease with which he accomplished this conquest alarmed the Italian princes. The Duke of Milan, Ludovico Sforza, called the Moor, who had invited Charles VIII to this undertaking, now began to organize a league against the French, which was joined by the republic of Venice; by Pope Alexander VI (Borgia); by the king of Spain, Ferdinand II, lord of Sicily and Sardinia; and by the Emperor Maximilian. Thus for the ancient Italian equilibrium they began to substitute the idea of European equilibrium. At Fornovo on the Taro, on 6 July 1495, a furious battle was fought which cost the French army many lives, and the allies boasted a victory. Charles VIII, however, succeeded in escaping and returning to France. But the few troops left by him in Naples were speedily driven out, and the Aragonese dynasty was once again established on the throne.

Whilst Charles VIII was marching into Italy, the rule of the Medici had been overthrown in Florence, and that city reorganized its old republican form of government. A Dominican friar, Girolamo Savonarola (q.v.), of Ferrara, at that time exercised a great influence over the people of Florence. But he aroused terrible enmity when in his holy enthusiasm he inveighed against the scandals that the court of Rome, represented at that time by the Borgias, furnished the world.

The Pope excommunicated him, and the discords in Florence furnished him a pretext for getting rid of the friar. On 23 May 1498, on the Piazza della Signoria, in Florence, Girolamo Savonarola and two of his devoted followers were hanged, and their bodies burned.

A new expedition to Italy was meanwhile preparing in France. The new king, Louis XII, being descended from Valentina Visconti, claimed his right to the dukedom of Milan, and to make his conquest more sure he entered into an alliance with the Venetians, promising them a portion of his territory. Ludovico Sforza, the Moor, betrayed by his Swiss mercenaries, was made prisoner at Nevara, 10 April 1500, and taken to a castle in France where he remained until his death.

Once master of Milan, Louis XII considered the conquest of Naples, and to ensure success he made pact with Ferdinand, king of Spain, that they should together attack Naples, and divide the territory between them. The conquest was easy (1501); but in the division of land there arose disputes between the victorious monarchs. During the war which followed, there occurred the celebrated tournament combat between 13 Italians and 13 Frenchmen, in which the palm of valor was awarded to the Italians. The war terminated in a sudden rout of the French on the banks of the Garigliano, 28 Dec. 1503. The Spaniards remained masters of all of Napoletano.

Whilst the two principal regions of Italy, Lombardy and Napoletano, thus passed under foreign domination, in central Italy the family

of the Borgias attempted to establish a court and sovereignty.

One of the sons of the Pope, Cæsar Borgia, called Duke Valentino, of the dukedom of Valentinois, which was ceded to him by the king of France, undertook to overthrow the ruling families in the cities of Romagna and the Marches. By most cruel and dishonorable methods he captured Imola, Forli, Cesena, Pesaro, Rimini and Faenza. As his captains had rebelled he pretended to accept their claims, but when he had them in his power condemned all to die. But on 18 Aug. 1503, after a few days' illness, Pope Alexander VI died. The Duke Valentino then became ill. This determined the dissolution of his state. Many of the subjected cities recalled their former rulers; others were occupied by Venetians. The new Pope, Julius II, obliged him to restore to the Church the few remaining fortresses. Cæsar Borgia left Rome, and died a few years later while fighting with Spain.

Pope Julius II initiated a very warlike policy. In order to retake from the Venetians the lands in Romagna which they were occupying, he formed a powerful league, which was called the League of Cambrai, from the French city, where it was signed. In this participated the Pope, the kings of France and Spain and the emperor of Germany. They all united against Venice. Thus, the old republic of S. Marco, which just at this time was beginning to find a formidable rival in its commerce with the Orient in the Portuguese, the discoverers of the new maritime route to the Indies, saw itself menaced also on the mainland by the principal powers of Europe.

In the spring of 1509, the French, after conquering the Venetians at Agnadello, captured Bergamo, Brescia and Peschiera. The pontifical troops seized the territory of Romagna. The Spaniards took from Venice the ports of Apulia, and the Emperor Maximilian, descending the Alps, advanced to Padua; but his repeated assaults on the city were valiantly repulsed, and he was finally obliged to return to Germany. But the salvation of Venice was due to the ability of its diplomats rather than to the arms of its generals. The former detached the Pope from his alliance with the League which he had organized. Julius II, interested in preventing the extension of the French power in Italy, made peace with Venice (1510) and invited Alfonso of Este, Lord of Ferrara, to follow his example; and because he would not obey he invaded his territory. But the French hastened to aid the Duke of Ferrara, and then the Pope, carried away by the idea of succeeding in freeing Italy from foreigners, organized against France a league with Venice and Spain, an alliance which was called the "Holy League," and was inaugurated with the battle cry of, "Away with the barbarians."

At first victory smiled on the French and their young and valiant general, Gaston de Foix. But after the battle of Ravenna, which was won by the French, and in which Gaston de Foix was killed (1512), the allies regained the advantage and were then joined by the emperor, who had been the ally of the French. In a few months the "League" succeeded in driving almost all the French from Italy.

The allies met in council at Mantua and assigned the dukedom of Milan to Maximilian Sforza, son of Ludovico, the Moor, and sent an army to restore in Florence the rule of the Medici, in order to punish the republican government of Florence for having shown itself favorable to the French.

The most prominent member of the Medici family at that time was Cardinal Giovanni, who on the death of Julius II (1513) became Pope and assumed the name of Leo X. According to the traditions of his family, he protected men of letters and artists, so that this period of marvelous development of Italian genius is called after him.

Meanwhile wars continued. The French could not reconcile themselves to the loss of Milan; but the attempt of Louis XII to reconquer it proved disastrous. His successor, Francis I, on the contrary, at the battle of Marignano (13–14 Sept. 1515) succeeded in capturing it.

He desired to make France the first European power; but the young Charles V, who was descended from Ferdinand, king of Spain, became a formidable rival. The army of Charles regained Milan from the French and placed in power Francesco II, Sforza, last son of Ludovico the Moor (1521). The French vainly attempted to reconquer Lombardy. In the battle of Pavia (24 Feb. 1525) Francis I was taken prisoner. In order to regain his liberty he agreed to hard conditions of peace, but hardly had he touched French soil when he broke faith and entered into an alliance with Venice, Florence and with the new Pope, Clement VII, who also belonged to the House of Medici. During the war which ensued, 12,000 Germans, followers of the doctrine of Luther, descended on Italy, captured and pillaged Rome (1527). On hearing the news Florence overthrew the rule of the Medici and proclaimed anew the republic. Finally, the tide of war turned in favor of the emperor, more especially after the great Genoese admiral, Andrea Doria, went over into his service. The Pope and Francis I made terms with him; and then the other allied forces had to submit to the conditions imposed by the victors. Charles V went to Bologna, where he was solemnly crowned emperor, 24 Feb. 1530. In the diplomatic congress called together, it was determined to allow Francesco II, Sforza, to retain the duchy of Milan on condition that at his death it should pass into possession of Spain. Florence was to reinstate the Medici, as Charles V had promised the Pope. Already, at the end of the autumn of 1529 a Spanish army had come to lay siege to Florence, which, however, showed itself prepared to defend its liberty to the last. All the citizens, without regard to age, flew to battle on its walls. But this heroic resistance was in vain, owing to the treachery of Malatesta Baglioni, to whom Florence had entrusted the command of her troops. The decisive battle of Gavinana, near Pistoia, was fought 3 Aug. 1530, at which time was slain the Florentine, Francesco Ferrucci. A few days later, Florence surrendered to the imperial army, who ceded the rule to the Medici family.

Spanish Predominance (1530–1700).— In the midst of the wars which during the first 30 years of the 16th century convulsed Italy and ruined it economically, its political conditions also greatly changed. Of the five leading states, the Napoletano (Naples) had become a

vice-royalty of Spain; Lombardy was occupied by the military forces of Charles V, the other two states — Rome and Florence — had lost almost all their political importance and were obliged to bow to the Spanish rule; and Venice, although proudly maintaining her independence, was no longer in a position to hold her own against the great powers of Europe.

France made another attempt to oppose the predominant power of Charles V in Europe and renewed the war on several occasions. Piedmont was the chief sufferer. The Duke of Savoy, Charles III, who had desired to remain neutral, ended by losing almost all his territory. Fortunately his son Emanuele Filiberto, who had entered the service of Spain, gained (10 Aug. 1557) the great victory of Saint Quentin, in Flanders, and decided at the conclusion of the war to revisit his own state. Peace was concluded in 1559 at Cateau Cambresis. By the terms of this peace France was to restore almost all the territory occupied by her during the war, and thus the long rivalry between the two powers was definitely settled in favor of Spain.

The Spanish domination soon enervated the minds and corrupted the customs of the people; and they became an enfeebled race, weak, enervated, without enthusiasm and without ideals; and to make it worse, religious intolerance prevailed, which induced the Italians to mask their incredulity by hypocrisy.

The richest and most fertile provinces, Milan, Naples, Sicily and Sardinia, were subject to Spain and the rest of the peninsula felt the reflex action of this subjection. Thus, the popes were on friendly terms with the Spaniards, because the latter had supported their ecclesiastical policy, and this friendship was soon changed into servility. The Medici were favorably disposed toward Spain in order that they might be let alone; the republic of Genoa from the time of Andrea Doria was an ally, or rather a servant of Spain; and the dukedoms of Ferrara, Mantua and Parma were too weak to venture on an independent policy. Italy was indeed a Spanish province.

Two of the Italian states alone maintained their dignity and independence: the duchy of Savoy and the republic of Venice; and in these two regions were comprised all that was best in Italian life of the period.

Emanuele Filiberto was the second founder of the House of Savoy. With his sword he regained the inheritance of his family, and then devoted his attention to performing the duty of a restorer and legislator to his people. His son and successor, Charles Emanuele I (1580–1614), ambitious, bold, restless, endeavored by a continual series of wars to aggrandize his states. Through an agreement with France he obtained the marquisate of Saluzzo, ceding in exchange la Bressa and other territory on the Rhone. It was an advantageous exchange for him, for in this way the French were totally excluded from Italy. He then sought an alliance with France in order to wrest Lombardy from the domination of Spain, but the unexpected death of Henry IV prevented the execution of this great design. Spain demanded that he should disarm; but instead of obeying, he invited the Italian states, and particularly Venice, to combine against Spain in a war of independence. However, none of them accepted his invitation; but, unaided for many years he bore the assaults of the Spanish arms, showing that, in the midst of the military decadence and the political enervation of the various states of the peninsula, there was one who knew how to maintain the dignity of the Italian name!

His last war was for the succession to the duchies of Mantua and Monferrato, in which Spain also took part, as did the emperor and France. The whole upper Italy was traversed and devastated by various foreign armies, who also spread the plague. These were the sorrowful years described by Alessandro Manzoni in his historical romance, 'I Promessi Sposi.' The war still continued when Carlo Emanuele died.

Vittorio Amedeo, his son and successor, signed a peace by which he obtained the greater part of Monferrato, but ceded Pineolo to France, which thus once again got a foothold in Italy. The Prime Minister of France, Cardinal Richelieu, succeeded anew in forming a league against Spain, which was joined by the dukes of Savoy, Mantua and Parma. The war had scarcely begun when Vittorio Amedeo died (1637). His widow, Maria Christina, called Madame Royale, assumed the regency in the name of her son; but her cousins, Cardinal Maurizio and Prince Tommaso, wished to be associated with her in the government, and to this end they sought the aid of Spain. The Duchess, in her turn, had recourse to France, and thus Piedmont was once more traversed and devastated by Spanish and French soldiery. At length the princes of Savoy perceived that foreign powers were taking advantage of their dissensions for their own profit, and thought it best to come to an agreement among themselves.

In the second half of the 16th century Venice was apparently at the zenith of her power and prosperity, and her great painters, Titian, Tintoretto, Paolo Veronese, etc., by their *chef-d'œuvres* proclaimed her triumph to the world. In reality, however, she was depending on the wealth gathered in the past. Her power was already seriously threatened. In 1570 the Turks attacked Cyprus, and notwithstanding the long and glorious resistance of the Venetian troops, they succeeded in taking possession of the whole island. The Christian League, formed at that time through the zeal of Pope Pius V, armed a great fleet which gained the memorable victory of Lepanto over the Turks in 1571; but the results were meagre on account of the jealousy between the allied powers.

The republic, while professing zeal in religious matters, had always upheld the rights of the state in opposition to those of the Church. On that account it waged a lively dispute with Pope Paul V, who, annoyed at seeing his demands disregarded, excommunicated the republic (1606). Venice commanded the priests to continue the exercise of their worship under penalty of being banished from the territory, and almost all obeyed. Finally, through the interposition of the king of France, the Pope and the republic came to an agreement.

From now on, Venice became even less interested in Italian affairs, and in the Orient she sought only to defend against the Turks her farthest possessions. After a long war Candia passed under the dominion of the Turks. In 1684 Venice again took arms against the Turks, having as allies the emperor and the king of Poland. Her great general, Francesco Morosini,

conquered at that time the Peloponnesus, but on his death (1694) the era of the great Doges of Venice came to an end. Twenty years later the Peloponnesus again came under the power of the Turks.

Spanish domination in Italy lasted until the first years of the 18th century, and left sad traces behind it. No government ever took less care of its subjects than the Spanish government, which looked upon Italian provinces as lands that they might despoil, but not govern. The taxes became daily more intolerable, and the income which the government received from them was not disbursed for the advantage of those who paid them, but went to enrich the viceroys sent to Italy, to maintain the pomp of the court of Spain, and the enormous expenses of the wars which this power had to carry on in many parts of the world. There were frequent insurrections, notably that of Naples (1647) which is associated with the name of a young fisherman, Masaniello; but the government always succeeded in suppressing them by temporary concessions which did not alter the true condition of affairs.

Contested Predominance Between France and Austria (1700–1789).— The death of the king of Spain, Charles II (1700), and the war of the succession precipitated a long war between the French dynasty of the Bourbons and the German House of Hapsburg, supported by England and Holland. The Imperialists sought to retain possession of the territory which Spain had in Italy; hence, the war was carried on largely in the Italian peninsula. The Duke of Savoy, Victor Amadeus II, was at first supported by the Bourbons, but when they understood their own interests better they went over to the Imperial army. Then Piedmont was invaded and traversed in every direction by the French, who ended by laying siege to Turin (1706). Among the many glorious episodes during its defense is that relating to a private of the Miners, Pietro Micca, who at the sacrifice of his life saved the citadel from a nocturnal surprise assault. On 7 Sept. 1706, Duke Victor Amadeus II joined his troops to those under the command of Prince Eugene, and gained a great victory under the walls of Turin, in consequence of which the French were obliged to vacate Piedmont and the rest of Italy. By the Peace of Utrecht Sicily was given to Victor Amadeus II, who assumed the title of king. Sardinia, Naples and Lombardy were yielded to Austria. But a few years later the Italian Cardinal Giulio Alberoni, who had become Prime Minister to the king of Spain, attempted to regain possession of Sardinia and Sicily; but being threatened by the principal powers of Europe, the king of Spain retired his fleet and discharged his minister. Austria profited by this opportunity by compelling Victor Amadeus II to exchange Sicily for Sardinia (1720). Austria, however, did not long retain Sicily and Naples; for one of the sons of the king of Spain, Charles of Bourbon, taking advantage of the War of Succession in Poland which upset all Europe, seized these territories and founded the Bourbon Neapolitan dynasty (1734). To make up for this loss the Emperor Charles VI received the duchy of Parma and Piacenza, in which the Farnesi dynasty was extinct; and on the extinction of the House of Medici (1737) he assigned the grand duchy of Tuscany to Francis of Lorraine, husband of his daughter Maria Teresa.

The death of the emperor, Charles VI, (1740) gave rise to a fresh war of succession, which lasted eight years, and covered with blood many regions of Europe. In Italy the French and Spaniards attempted to wrest from Austria both Milan and the Duchy of Parma and Piacenza; but the Empress Maria Teresa was aided by the king of Sardinia, Carlo Emanuele III. Maria Teresa then sought to reconquer Naples, but the army she sent out was defeated at Velletri (1744). Meanwhile the French and Spanish fought, in alliance with the republic of Genoa, renewing their attacks in Lombardy; but after a few successes they were repulsed. Also the Austrians advancing as far as Genoa placed heavy tribute and humiliations on the people, but the inhabitants of Genoa rose up and repulsed them (1746).

The following year the French and Spanish attempted to cross into Piedmont by way of the Colle dell'Assietta, but were routed. The only important change that took place in Italy in consequence of this war was the assigning of the duchy of Parma and Piacenza to Don Philip of Bourbon, son of the king of Spain.

After the Treaty of Aquisgrana, which signalized the end of this war, Italy enjoyed a long period of peace (from 1748–92), which the various states of the peninsula devoted to their internal development. A current of new thought had overrun the whole of Europe through the writings of French authors; and these had given rise everywhere to a sort of tendency toward reform, animated by a principle of toleration in matters of religion and by the idea of the need of a great social regeneration to ensure a greater degree of justice among men. The governments ended by accepting these and sought to put them in practise, the more willingly because the abolition of the privileges enjoyed by the nobles and the clergy represented an advantage for the sovereigns and also pleased the people, who were thus freed from a thousand annoyances, burdens and vexations.

In Naples, Charles of Bourbon (1734–59) acquired a good character for his civil and ecclesiastical reforms. In the other branch of the Bourbons, at Parma, Duke Philip (1748–65), who introduced great reforms, was succeeded by his son Ferdinando, who abolished even those already established.

In Lombardy, on the other hand, under Maria Teresa (1740–80) was inaugurated a period of material and intellectual regeneration; and Joseph II, who succeeded her in the government, prosecuted reforms with even greater energy than his mother. Thus also in Tuscany, where Francis of Lorraine (1738–65) was succeeded by Peter Leopold (1765–90), who may justly be considered the greatest of the reform princes of Italy.

French Preponderance (1789–1815).— The breaking out of the French Revolution produced a two-fold effect on Italy. Her rulers, in terror, halted their reforms, whilst the people, excited by the news from Paris, began to desire a change in the order of things with more eagerness than ever. Hence arose discords which daily became more aggravated, when arrests and torture were resorted to in order to suppress the revolutionary spirit.

Piedmont, together with Austria, opened the war against France in the summer of 1792, and the French were victorious, and in the same year, 1792, took Savoy and Nice. In 1796 the young general, Napoleon Bonaparte, separated the Austrian army from that of Piedmont; obliged King Victor Amadeus III to make peace; then penetrated into Lombardy in pursuit of the Austrians, and by a series of brilliant victories secured possession of it. These events awoke Italy from her torpor, and encouraged the secret aspirations of the people. Reggio and Modena rose in insurrection against the Duke, and uniting themselves to Bologna and Ferrara, which had been wrested by the French from the rule of the Pope, they organized a republic, called Cispadana, which adopted the Italian tri-colored flag, with the white and red of the French flag but with green substituted for blue.

Bonaparte also invaded the Pontifical States, obliging the Pope to subscribe to burdensome conditions of peace; then he pursued the Austrian army across the Alps as far as Leoben, at which place Austria decided to conclude preliminaries of peace (April 1797). Just at this time, in Verona, the populace and the peasantry rose in arms against the French and butchered them. This insurrection was quickly wiped out in blood, but General Bonaparte made use of it as a good pretext for an attack on the aristocratic republic of Venice, and by threatening war, he compelled it to transform itself into a democratic government. In Genoa also, by Bonaparte's orders, the ancient form of government was abolished and the Ligurian League restored in imitation of the French government. Lombardy, which had been retaken from Austria, was made part of the Republica Cispadana and they became one republic, called the Cisalpine Republic.

In October 1797 peace was agreed on with Austria at Campoformio, in Friuli. By the terms of peace Austria was to renounce possession of Lombardy, but received instead the territory of the republic of Venice, which from this time ceased to exist. The cession of Venice to Austria gave the lie to the fine promises of liberty and independence that had been made by the French invaders, which was probably the reason for the harassing attacks and the plundering expeditions that occurred in the Cisalpine and Ligurian republics, which were now considered almost as vassals, which fact caused great dissatisfaction among the Italian populace. However, the two years (1796–97) showed a great awakening in the life of the peninsula.

In 1798 the French, on the pretext that the house of the French Ambassador had been violated, took possession of Rome, declared the government to have fallen into decadence and established a republic. Then, as the king of Naples had dared to declare war on them, they entered Naples and proclaimed a republic there, which they called Parthenopea, from the ancient name of the city. On hearing the news that Austria, in alliance with Russia and England, meditated a fresh descent into Italy, the French took possession also of Piedmont and Tuscany.

But the Austro-Russian army entered Italy in the spring of 1799, and repeatedly defeated the French, so that the latter were forced to retreat into Liguria. Naturally the republican governments, which had been established by them, not having sufficient standing in the country, were overthrown, and many of the citizens who had compromised themselves by the favor with which they accepted the new ideas were obliged to emigrate. The republicans of Naples capitulated on the promise of amnesty; but King Ferdinand and Queen Maria Carolina violating their promises took fierce vengeance on the heads of the republican government. Among them were Dr. Domenico Cirillo, Judge Mario Pagano, Francesco Conforti, Admiral Francesco Caracciolo, etc.

Napoleon Bonaparte assumed the rule in France, with title of First Consul. He intended to reconquer Italy, where the French now possessed only Genoa, and even here they found themselves besieged. Massena, commander of the French army, shut up in Genoa, held out heroically until 4 June 1800. In the meantime Napoleon at the head of another army entering Italy by way of the Saint Bernard threatened the Austrians from the rear and forced them to retreat toward Lombardy. At Marengo, near Alexandria, on 14 June 1800, a great and decisive battle was fought. The Austrians were forced to abandon all their conquests and again confirm the Treaty of Campoformio. Napoleon re-established the Cisalpine and Ligurian republics, and annexed Piedmont to France. The Neapolitan and Austrian troops evacuated Rome, which was presented to the new Pope Pius VII. Shortly after this Parma and Piacenza were ceded to France, and the Bourbons, who owned that duchy, were given Tuscany, which was made into the kingdom of Etruria.

At the close of 1801 Napoleon convoked a meeting at Lyons of 452 leading men of the Cisalpine Republic for the purpose of forming the new constitution, which was to be similar to that which then obtained in France. The republic was to be called Italian, and Napoleon Bonaparte was elected President. He nominated Francesco Melzi as Vice-President. From this time the evils consequent on the military occupation of the preceding years began to diminish and this republic was able to enjoy true prosperity. The name of Italian Republic was pleasing to the people, and as the President was at a distance their independence seemed all the greater. Melzi knew how to attract general sympathy and governed wisely. But when Napoleon became emperor of the French he changed the republic of Italy into the kingdom of Italy, and was crowned at Milan 26 May 1805. He named as vice-regent Eugene Beauharnais, a youth of good and gentle disposition, who endeavored to show his gratitude toward the emperor by a blind obedience. As a result of the war of 1805, Austria had to renounce Venice, which became part of the kingdom of Italy, to the great joy of the Italian people, who flattered themselves that this was the first step toward the unification of the entire peninsula. Instead of that, Napoleon drove the Bourbons out of Naples, and made of it a separate kingdom, placing his brother Joseph Bonaparte on the throne. Then, as he had already annexed Liguria to the French crown, he also annexed Tuscany and Latium, leaving to the kingdom of Italy only the Marches. With

this invasion ceased the temporal power of the popes (1809).

Thus the whole Italian peninsula was dependent directly or indirectly on Napoleon. The House of Savoy retained only the island of Sardinia; and the Bourbons of Naples Sicily. Napoleon, who moved the kings about as though they were chessmen, in 1808 raised his brother Joseph to the throne of Spain, and sent to Naples in his stead his cousin, Joachim Murat.

A great change had taken place, materially, intellectually and socially, in the Napoleonic dominions. New roads were opened, large canals dug, splendid monuments erected, agriculture encouraged, industry and commerce favored, letters and the fine arts promoted. But his despotic will alienated Napoleon's subjects, especially when they remembered that having attained such great power, nothing could hinder his ambitious aims, and that to satisfy his own vanity he was always ready to sacrifice the lives of his soldiers. Hence, when his hour of disaster came he found little support in Italy.

In the autumn of 1813 Austria advanced threateningly on the kingdom of Italy. The viceroy, Eugene Beauharnais, attempted to defend it, but in vain, particularly as the king of Naples, Joachim Murat, in order to retain his own throne, had entered into secret negotiations with Austria, and had also led an army toward upper Italy. The Austrians had already occupied a great portion of the kingdom when the news arrived in Italy that Napoleon had been forced to abdicate. Then arose an insurrection in Milan against the French government. Count Prina, Minister of Finance, was massacred by the mob (April 1814). In consequence of these outrages, the viceroy, Eugene Beauharnais, left the kingdom. Milan was occupied by the Austrian troops.

Almost all the former governments were restored. The Pope, Pius VII, re-entered Rome, Duke Ferdinand III took back Tuscany. The duchies of Parma and Modena were re-established. Victor Emanuele I of Savoy re-entered Turin.

Joachim Murat alone retained the kingdom of Naples; but he soon had reason to doubt that Austria would keep the promise she had made him. He, therefore, became reconciled to Napoleon, who was then in the island of Elba, and when he left it to set out on the marvelous 100 days, Murat took up arms against Austria, inviting Italy to assist in a war of independence. He was defeated, and obliged to renounce the throne (20 May 1815). From Corsica, whither he had fled, he tried to reconquer Naples, but was made prisoner at Pizzo in Calabria, and shot (13 Oct. 1815).

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6. ITALIAN HISTORY FROM 1815 TO 1907. Before the French Revolution, the territory which now forms the kingdom of Italy was inhabited by about 17,000,000 people, and was composed of nine principal states: The kingdom of Sardinia with Piedmont and Savoy; the republic of Genoa; the duchy of Parma and of Piacenza; the duchy of Modena; the republic of Venetia; the republic of Lucca; the grand duchy of Tuscany; the Pontifical States; the kingdom of Naples with Sicily; and besides two regions belonging to foreign powers, i.e., Corsica to France, and Lombardy and Mantua to Austria. In these countries, the political, social, economic, judicial, financial and intellectual conditions were deplorable; the power of the sovereign was absolute; the population was divided into classes, some of which possessed remarkable and varying privileges; industry, commerce and agriculture were neglected, with consequent poverty of the laboring classes; justice was meted out unfairly to all, barbarously conducted and with no proportion between the crime and its punishment; the public finances were in a ruinous state; education was very limited and difficult to acquire. Into this Italy, so complex and unprogressive, came the French Revolution (1789–1814) with the arms of the republic and of the emperor; destroyed the existing states and set up and supported the Glorious Principles of 1789. After undergoing various transformations, Peninsular Italy (Sicily belonged to the Bourbons of Naples, Sardinia to the House of Savoy and Corsica to France) was thus partitioned by Napoleon I: one part was united to the French Empire (Piedmont, Liguria, Parma and Piacenza, Tuscany, Umbria, Lazio); a second part formed the kingdom of Italy, which was destined to become independent under its own king, with the capital at Milan (composed of Lombardy, the province of Venetia, Modena, the province of Rome and the Marches); a third part, with the title of the kingdom of Naples, was held successively by two French kings, Giuseppe Bonaparte and Gioacchino (Joachim) Murat, with a certain independence. In these countries, through the initiation of foreign folk, but with the co-operation of many Italians also, arose a period of economic activity; streets were opened; institutions were founded for the progress of science and the diffusion of knowledge; the government and administration of affairs became vastly superior to what had preceded; and the equality of all before the law was established. The moral, civil and economic progress throughout the entire peninsula was very evident and very considerable; but the people ended in becoming very discontented because of the incessant levies, which robbed the country of the flower of its youth, following the military enterprises of Napoleon, and also because of the enormous taxes which the emperor imposed upon every one according to his own despotic will. When the Napoleonic dynasty fell, the United Powers, which had overthrown it, in order to wipe out every trace of the revolution in Italy, wished to re-establish the states exactly as they were before the coming of the French (except the republics, which were not reconstituted), and they recalled the former sovereigns, and the entire

country was placed under the rule, direct or indirect, of Austria.

The Treaties of Paris and the Congress of Vienna (1814–1815) finally reorganized Italy in the following manner: there were seven principal states, nominally independent, and two regions governed by foreign rule. The independent states were: (1) The kingdom of Sardinia, to which the House of Savoy returned, which had at its head Victor Emanuel I, and to which was also given the territory of the former republic of Genoa; (2) the duchy of Parma and of Piacenza, given to Marie Louise of Austria, the wife of Napoleon I; (3) the duchy of Modena, to the Archduke Francis IV of Austria; (4) the grand duchy of Tuscany, to Ferdinand III of Austria; (5) the duchy of Lucca, to Maria Louisa of Bourbon; (6) The Pontifical State, to which Pius VII returned, freed from prison; (7) the kingdom of the two Sicilies, i.e., Naples and Sicily, to which Ferdinand IV (now become I) of Bourbon returned. The regions subject to foreign powers were: Corsica, which remained French, and the kingdom of Lombardy-Venetia, which passed to the House of Austria. The latter, therefore, possessed incontestible power in all Italy, since in addition to the direct authority over the kingdom of Lombardy-Venetia, it had its own princes in power over Tuscany, Parma, Modena and exercised a sort of guardianship over the other states. Austria, the centre of reaction in Europe, represented in Italy the Holy Alliance, which had the plan to re-establish the divine right of monarchies and to hold the people quiet and submissive, and to carry out this plan the sovereigns belonging to the Alliance were obliged to help each other whenever called upon.

The returning princes were well received, because the allied powers had fraudulently promised that they would not forget the aspirations of the nation, and because the people hoped that, not only would the excellent institutions founded by France be preserved but also that there would be an end to the waste of money and of blood which characterized the last years of the oppressive Napoleonic régime. The princes, on the contrary, enraged against everything that reminded them of the usurpers, gave themselves up to destroying all that the revolution had created. They banished or humiliated every one who had received offices from France; abolished all liberty of thought, of the press, of speech; re-established the ancient laws which provided for privileged classes; denied civil rights to Hebrews and to Protestants; gave excessive power to the clergy, and restored to courts of justice the savage methods which barbarity had formerly furnished. Education became possible to only the few. In this mad reaction the Piedmont and Napoleonic government distinguished itself especially. The King Victor Emanuel I of Sardinia said that he considered that he had slept all the years of his exile and that he desired that his subjects should do so hereafter; therefore, he endeavored to establish the state in every place exactly as it had been before the revolution. Discontent soon manifested itself everywhere. The people, finding themselves in an unjust and unbearable situation, commenced a Titanic struggle by means of secret societies, of conspiracies, of revolutions, even of open war, which lasted from 1815 until 1870, and finally made Italy one, free and independent; after which the new state was able to develop its own powers in such a way as to attain in a very short time that grade of prosperity and success in which it finds itself to-day.

The years from 1815 to 1907 are those of the *Italian Resurrection*, which should be divided into a *Political Resurrection* (1815–70) and an *Economic Resurrection* (1870–1907), and embraces five periods: (I) Conspiracies and insurrections promoted by the Carbonari (1815–31); (II) Conspiracies and insurrections promoted by "Young Italy" (1831–46); (III) Action by the political neoguelfic school (1846–49); (IV) Work under the direction of the House of Savoy and the foundation of Italian Unification (1849–70); (V) Development and progress of free Italy (1870–1907).

Period I.— Conspiracies and Insurrections Promoted by the Carbonari (1815–31). — The general discontent, the necessity of a radical change in public affairs, and the impossibility of displaying their own aspirations in the full light of day, compelled the Italians to form secret societies by means of which they hoped to attain their prohibited ends. In this first period the Carboneria was the principal one, an emanation from the Mazzoneria, whose symbols and language it had preserved; it arose in Naples during the reign of Murat, and was propagated after the return of the Bourbons for the organization of the oppressed against their oppressors, and hence spread throughout all Italy between 1815 and 1820. It enrolled among its members especially persons of the middle class, professional men, employees, the military and also some nobles. The sections called themselves Vendite. The society gradually disbanded and the subdivisions assumed contrasting and fantastic names: Society of the Filadelfi, of the Adelfi, of the Maestri Perfetti (perfect masters), of the Spilla Nera (black pin), of the Federazione (confederation), etc. The program common to all was: independence of all foreigners, a form of liberal government and the confederation of all Italian states, which did not exclude the fact that some of the Vendite changed this general program, in so far that instead of the Confederated Italy they wished one Italy under the republican form of government, not the monarchial. The reactionary government, which feared the Carboneria, gave countenance to some societies formed with the opposite designs, the more important among which were the Calderari and the Sanfedisti. The history of Italy from 1815 to 1831 is contained in the history of the Carboneria.

The first revolutionary movement broke out in 1817 in Macerata, in the Marches, where the Carbonari were numerous, and was at once repressed by the Papal government. In 1819 the Austrian police discovered a Carboneria conspiracy in Polesine in Rovigo, arrested many persons implicated, who were found guilty and put into prison, together with Pellico, who wrote the book called 'Le Mie Prigioni' ("My Prisons"). In 1820, after *Il Conciliatore*, organ of the liberal patriotic party, had been suppressed, the discovery of other conspiracies led to the arrest in Milan of Pietro Maroncelli and of Silvio Pellico, followed by the arrest of Federico Confalonieri, head of the conspiracy, of Giorgio Pallavicino, of Gaetano Castiglia and a hun-

dred others, who, found guilty during the years 1821–24, went to populate the dreadful Austrian prisons.

In Naples, the Carboneria conspirators were very numerous, especially in the army, and it was precisely the army which initiated the Revolution of 1820–21. On 2 July 1820 their spirits roused by the triumph of liberty in Spain, two officers and 130 soldiers started from Nola toward Avellino to the cry of "Liberty and a Constitution"; then uniting themselves with two insurgent regiments under Guglielmo Pepe, whom they proclaimed their general, they all went to Naples, where the king, taken by surprise and also under compulsion of the citizens, promised a constitution, to which he swore fealty (13 July), invoking the lightnings of the Almighty upon his head if ever he violated it. In Palermo also the people rose, but in Sicily the movement took the form of a Separatist Movement, so that the constitutional government at Naples was obliged to send two generals to overcome the insurgents and preserve the union of the two parts of the kingdom. Meanwhile the king, breaking faith, invoked the aid of the sovereigns of the Holy Alliance, who invited him to Lubiana, where in January 1821 they held a congress. The king had promised to defend before the allied sovereigns the constitution to which he had pledged himself; but instead, the powers decided to intervene in the affairs of the Neapolitans by force of arms in order to re-establish the absolute monarchy. An Austrian army, commanded by General Frimont, invaded the kingdom, conquered the constitutionalists led by Gen. G. Pepe, at Antrodoco, entered Naples 23 March 1821, and then occupied Sicily. The constitution was abolished; those who had headed the movement were cast into prison, some were sentenced to death and many were exiled.

In Piedmont, where the Carboneria was more commonly known as the Federazione (the Confederation), the Revolution of 1821 had two objects; to obtain a constitutional government and to drive the Austrians from the peninsula, in order to form with the House of Savoy a kingdom of all northern Italy. The promoters of this were chiefly officers of the army belonging to the principal aristocratic families, and they believed that the young Prince and heir-presumptive to the throne, Carlo Alberto of Savoy-Carignano, was also of their party, since in private conversations with his friends he made no attempt to conceal his ardent love for the independence of his country and his desire to do something for her. The insurrection burst forth when it became known that an Austrian army had arrived at Naples to quell this revolution, and they believed that they could attack it from the rear with the help of the Lombardy-Venetians, who were to rise at the call of the Piedmontese. On 10 March 1821 a regiment in Alessandria rose, and formed there a provisional government, and during the days following other garrisons arrived in that city; some soldiers, at the gate of Turin, shouting for the constitution, raised the tri-colored banner; and the king, Victor Emanuel I, who felt that he could not change the order of events and did not wish to use violence against his subjects, abdicated in favor of his brother, Carlo Felice, naming as regent during the latter's absence the Prince of Carignano, who, in obedience to the demands of the people, conceded the Spanish constitution. But the king, Carlo Felice, in Modena, annulled this concession, ordered Carlo Alberto to withdraw into Tuscany, assembled that part of the army which had remained faithful and called for help from Austria. The soldiers in favor of the constitution were beaten (8 April) near Novara; the heads of the movement — the most famous of whom was Santorre of Samtarosa — in order to escape the gallows, were obliged to exile themselves in Spain, Portugal, Greece, France or England.

These attempts at gaining liberty were followed by 10 years of frightful reaction, in Piedmont as well as at Naples and everywhere in Italy. Austria more than ever was master of all; nevertheless, the Carbonari, beaten but not destroyed, continued to work in secret.

When in 1830 upon the accession of Louis Philippe to the throne of France, it seemed that the liberal aspirations of Europe had found strong and secure foundations, the patriots of central Italy hoped to be able to form a kingdom with a constitutional government, consisting of Lombardy, Modena, Parma and Ferrara; a kingdom which they would give to Francesco IV, Duke of Modena, who had much ambition and great wealth, and who they knew had an understanding with the Carbonari and was a friend of one of their most highly esteemed chiefs, Ciro Menotti. It is said that at the last moment the Duke was seized with fear of being discovered and severely punished by Austria, and, therefore, abandoned the conspiracy. Menotti, in consequence of this, wished to anticipate the revolution; but on the night appointed for the rising (3–4 Feb. 1831) the Duke, with 800 soldiers, surrounded his house and took him, with many others, prisoners; and when he knew that the revolution was so widespread throughout the state, he repaired to Mantova, taking with him Menotti, to be under the protection of the Austrian cannon. This revolution extended to the Pontifical State, where Bologna (5 February) and later other cities rose in rebellion; the temporal power of the Pope was declared abolished, and they founded, together with Romagna and the Marches, a free state which they called the United Provinces. From Parma also the Duchess Maria Louisa was obliged to flee and take refuge in Piacenza. The Austrians, called upon for help, intervened, overcame the Italians and again established in every place the preceding government. The Duke of Modena was savage in his revenge; shortly after his return Ciro Menotti and others were hanged on the gallows. The foreign powers in a Memorandum publicly invited Pope Gregory XVI to give to his state a more pacific administration; but the Pope, instead of ameliorating public administration of public affairs, gave himself up to a violent reaction, so that in 1832 the revolution again broke out. The Austrians returned, and the French occupied Ancona in order not to leave Italy in the power of Germans alone, and neither of them took their departure until 1838.

All these movements of the Carbonari, therefore, failed, because they were successive, not contemporaneous; because they were not sufficiently prepared and not wisely guided; because, being the work of the minority, they were not participated in by the people; and

finally, because their plans were to establish a kingdom, not a nation.

Period II.— Conspiracies and Insurrections Promoted by "Young Italy" (1831–46). —The impossibility of obtaining independence and freedom for Italy by means of the Carboneria was impressed upon the people chiefly by Giuseppe Mazzini (1805–72) of Genoa, who had been a member of this society and in 1830 by a piece of ordinary treachery had been cast into prison. While incarcerated in the fortress of Savona, he conceived the idea of forming a new association, which should be national and not sectional, and which, while preparing in secret for a revolution, should openly propagate its principles by means of the press. Released from prison, he was obliged to go into exile, and in Marseilles he became convinced that it was useless to expect any generous initiative on the part of any sovereign; he therefore (from among the many Italian refugees of the Revolution of 1820–21 and that of 1831) founded in 1831 "Young Italy," an association of persons who believed in the law of progress and duty, and who were obliged to swear to work — by means of education and insurrection — to the end that Italy should become one, free, independent and republican. To disseminate the ideas and the aims of the association they published a periodical (1832) entitled *La Giovane Italia* ("Young Italy"), and the society and the paper spread throughout the peninsula, especially in the kingdom of Sardinia, in which the king, Carlo Felice, the last of the eldest branch of the House of Savoy, had been succeeded by Carlo Alberto of Savoy-Carignano. Upon this state Mazzini founded his greatest hopes, because he was convinced that having brought under the influence of these new ideas the Piedmontese army, the chief military force of the Italian states, the society would be able to drag down the tyrants from their thrones and hunt the foreign oppressors from out the land. Therefore they sought above all recruits from the Sardinian army. But the police were not slow to discover the conspiracy in 1833, and proceeded to make arrests in Geneva, Alessandra, Chambery and other places. Vincenzo Gioberti, unable to disprove his guilt, was sentenced to exile. Standing courts were immediately set up, which instituted proceedings that ended with severe condemnations and punishment of soldiers and citizens. Young Italy then sought her revenge. An expedition composed of some hundreds of Italians, Poles, Germans and Swiss, prepared by Mazzini, invaded Savoy from Geneva (1834); but, not finding help from the inhabitants, was easily repulsed by the soldiers of the king. Genoa, which was supposed to rise at the same time, did not stir; there followed at once condemnations of the conspirators, among which was a sentence of death against Giuseppe Garibaldi (1807–82).

Young Italy remained stunned by these severe blows for some years, but after a decade had passed she again became active. In 1843 at Savigno and in other places in Romagna, several revolutions against the pontifical government took place, but the insurgents were beaten, and many of them were imprisoned or condemned to death. A band of Calabrian patriots marched toward Cosenza (15 March 1844) and entered the place carrying the tricolored banner and shouting "long life to liberty and down with despotism," but being attacked vigorously by the Bourbon militia, they were quickly dispersed. Information of this somewhat insignificant movement reached two courageous youths, brothers Atilo and Emilio Bandiera, of Venice, who, being of the same political faith as Mazzini, had abandoned the service of the Austrian marines (in which they were officers and their father an admiral) and had fled to Corfu, there to wait for the moment to strike a blow for liberty and their country. Having collected other exiles, among them Nicola Ricciotti, they set out for Calabria, where they believed that the insurrection was being carried on, and disembarked at Cotrone, not expected, not knowing to whom or where they should turn, but convinced that if the undertaking should end with the sacrifice of themselves, then such sacrifice would help the cause of Italy. Received in an unfriendly manner by the people — perhaps victims of treachery — they were attacked by the police and a battalion of the Bourbon military; some were taken prisoners, some were wounded and some were killed. A court-martial condemned to death the survivors, who were shot near Cosenza, only a very few being allowed to go free. In 1845 the agitation by Mazzini induced the Romagnoli to make another attempt; Rimini rose and a provisional government was installed; but the liberal troops were put to flight by the Papal soldiers, and the rebels fled, reappearing in Tuscany.

These and other attempts all met with failure, because the people who should have made them succeed were not as yet sufficiently educated up to the national idea, and because the number of insurrectionists did not suffice for the extremely difficult task of redeeming and uniting Italy.

Period III.—Action of the Neoguelf Political School (1846–49).— In 1843 Vincenzo Gioberti, an exile for 10 years in Brussels, published there a book entitled 'Upon the Moral and Civic Pre-eminence of the Italians,' in which, with much eloquence, he developed the following conceptions: That Italy could rise again without recourse to insurrections; that this resurrection could come to pass, uniting the entire peninsula, by means of a confederation of her princes; that to establish this Italian unity two provinces especially should be active — Rome, which should give the Pope as head of the confederation, and Piedmont, which should give its military force; that the princes should and would make wise and pacific reforms; and that Italy, thus leagued together, guided by a liberal Pope, would then rise to exercise that universal influence in action and in thought to which she was destined by her very nature. This book was rapidly disseminated throughout the peninsula and gave a great impetus to thought. In 1844 Cesar Balbo, in a work called 'Upon the Hopes of Italy,' argued that the confederation would be possible only after the Austrians had been driven out from Italy; he advised, moreover, above all that the young men should be instructed in arms for a national war. In 1845 Massimo d'Azeglio wrote 'Upon the Latest Developments in Roman Affairs,' in which he demonstrated that conspiracy, sedition, partial insurrections, could not but be injurious to the establishment of liberty; that they should, on the contrary, first

give proof of their civic courage by demanding openly from the government liberal reforms and institutions; and then of their military courage by conquest — when the occasion should arise — of their independence from foreign invaders. Following the publication of these books came many others, which argued the necessity of abandoning revolutionary movements, the advantage of looking frankly to the princes themselves for the reform of public ordinances and the possibility of making liberty and religion go peacefully side by side. Thus they went on, forming a new political school, which was called "neoguelfa," and of which Gioberti was the inspiration and the leader. The Neoguelfi, then, differed from the disciples of Mazzini in their aim and in their methods. In their aim, because deeming it impossible to take Rome from the Pope on account of the opposition which it would raise among Catholics throughout all Europe, they wished to substitute for the united republic desired by Mazzini a confederation of princes presided over by the Pope; and they differed in their means because in place of popular and partial revolutions they wished to substitute pacific propaganda in order to obtain liberal reforms from the sovereigns, and preparation for national war in order to acquire independence.

This program seemed to be realized at once, for on 15 June 1846, Cardinal Giovanni Mastai-Ferretti was elected Pope with the name of Pius IX; he was noted for his liberal sentiments, and his first act, most unusual, was a general amnesty to political offenders who filled the prisons of the Pontifical State, which amnesty awakened enthusiastic joy, not alone in Rome but throughout all Italy. In 1847 other reforms followed, such as the concession of moderate liberty to the press, which allowed the foundation of various newspapers; the institution of a committee of state, composed of the laity, and a council of ministers; and the organization of the civil guards. The populace not only applauded but was really delirious with joy and demanded that the sovereigns should do as much as the Pope. And in this way they influenced the Grand Duke of Tuscany, Leopold II, and the king of Sardinia, Carlo Alberto. The latter dismissed his reactionary minister, Solaro of Margarita, and in October and November 1847 he granted a moderate liberty to the press, improved the judiciary ordinances, conceded to the citizens the election of municipal councillors. Public enthusiasm was extraordinary and the names of Pius IX and of Carlo Alberto were lauded to the skies. The movement extended throughout the peninsula and spread through all classes of the population, because the initiative came from the head of the Church and because literature had taken upon herself a civic duty and disseminated widely sentiments of liberty and independence. Every mode of literary expression became an instrument for patriotic propaganda. The romances of Guerrazzi and of d'Azeglio, the tragedies of Manzoni and of Niccolini, the poetry of Leopardi, of Berchet, of Rossetti, of Giusti and of hundreds of others recalled to Italians in words of fire their former greatness and glory and incited them to rise from the pitiful conditions into which they had fallen. Literature, painting and music had civic and national intentions.

The tiny spark which started the great conflagration was lighted in Sicily. The natives of Palermo rose in arms 12 Jan. 1848, and their example was promptly followed by the entire island; and as soon as they also rose in Naples, the king, Ferdinand II, who had not imitated Pius IX and other princes in regard to reforms, was seized with great fear and did more than any of them, for he gave them directly a representative constitution. The excitement throughout the entire peninsula became enormous at this piece of news, and the sovereigns were forced to concede also everything which the most reactionary of the princes had ever refused. Carlo Alberto on 8 February promised and on 4 March published the 'Statute,' which, preserved by him and his successors, is still the foundation of all law in the kingdom of Italy. Yielding to the persistent demands of the citizens, Leopold II and Pius IX also promulgated a constitutional statute. Having become free henceforth as far as the princes were concerned, the people could now think of securing freedom from foreign oppression, and a favorable occasion was not long in presenting itself.

When the news that on 24 February the Parisians had overturned the throne of Louis Philippe, arrived at Vienna, it incited an insurrection; the news that this insurrection at Vienna had caused the fall of Minister Metternich induced Venice first of all to rise against the Austrians, drive them out and proclaim a republic; then Milan in a heroic struggle of five days (18–23 March) succeeded in forcing the hated oppressors out of the city. Carlo Alberto thereupon on 23 March declared war against Austria and took the field to give independence to Italy. The Pope, the king of Naples and the Grand Duke of Tuscany were constrained by the demands of the people to take part in the expedition and sent soldiers into the Valley of the Po. But the Pope, in a proclamation on 29 April — probably because he feared a schism in Germany — declared that he could not participate in a war against the Austrians because they were Christians; and the king of Naples, declaring that he had not set forth on this road to liberty of his own free will, came into conflict with Parliament, dismissed it, smothered in blood the agitations in the principal cities and recalled to the kingdom the troops which had been started for the war. Carlo Alberto, who had arrived at Mincio, found himself consequently quite alone and deserted, but nevertheless he conquered the Austrians at Goito (30 May), but was in turn beaten in several encounters; he was forced to a retreat, which was rendered more disastrous by other defeats, and which terminated in the Armistice of Salasco (10 August), by the terms of which Lombardy and Venice, which had given themselves to the king, were left in the hands of the triumphant enemy. Venice, however, declared herself a republic under the Presidency of Daniele Manin, and thought of defending herself alone. The Pope, terrified by the rage of the Democratic party and by the assassination of the president of the Council of Ministers — Pellegrino Rossi —fled on 24 November to Gaeta near the king of Naples. In Piedmont, the radical party wished a renewal of the war, although the country was quite unprepared; and the king did commence

it again, but in a very few days all was over. At Novara (23 March 1849) the Sardinian army was completely defeated by the Austrians, and on the same evening, Carlo Alberto, convinced that the conquerors would make better conditions with another sovereign, abdicated in favor of his eldest son (who became King Victor Emanuel II), and retired in exile to Oporto in Portugal, where he died 28 July in the same year.

Two glorious conflicts ended this first unfortunate war for Italian independence.

The Pope having fled to Gaeta and being invited in vain to return, a constitutional assembly (9 Feb. 1849) abolished by proclamation the temporal power of the popes and set up the Roman Republic. Pius IX called for armed intervention from the Catholic nations to recover his temporal domain, and Naples, Spain, Austria and France took arms. Rome prepared to defend herself and Italians from all over the peninsula flocked to her standards. General Giuseppe Garibaldi, although he was not commander-in-chief of the military forces of the republic, played a splendid part. A triumvirate, composed of Giuseppe Mazzini, Aurelio Saffi and Carlo Armellini, with unlimited power, provided for the public necessities. The Austrians occupied Bologna and took possession of Ancona; the Neapolitans were compelled to halt at Velletri by Garibaldi; the Spaniards, disembarking from their ships, covered themselves with ridicule. The French, landing at Civitavecchia under the command of Oudinot, were driven from Rome 30 April. And when they turned against Gianicola (Janiculum) the defenders in numerous attacks from the 3d to the 30th of June gave extraordinary proofs of valor and sacrificed many noble lives. But the enemy nevertheless constantly approached nearer the city and bombarded it. The French finished by entering Rome, while the constitutional assembly in the Campidoglio ordered the army to "cease a defence which had become impossible and to remain at its post." The triumvirate was dissolved, and Garibaldi with some of the best of his men left the city 2 July and, pursued by France and Austria, commenced that famous retreat in which he aimed to go to the help of Venice, still in a state of siege, and during which he lost his heroic consort, Anita.

Venice, turned republic, had decided to resist at all cost the Austrians who were besieging her; and splendidly did she keep her word. Surrounded by a circle of iron which each day grew closer, bombarded day and night, tortured by hunger and cholera, after a defense which was an honor not only to the city herself but to all Italy, she was obliged to capitulate on 24 August, and her most strenuous champions went into exile.

Thus, after the attempts of the Carbonari and those of Young Italy, the efforts of the Neoguelfi also failed. Put to the test of deeds, their program had proved itself impractical, although they had proved that it was useless to hope for anything from the liberality of princes irremediably retrogressive; that it was disastrous to start the campaign with unprepared popular forces against a strong enemy hardened to war; that it was unwise to commence the struggle for independence without first spreading and disseminating throughout the entire country the sentiment of duty toward one's country. At all events the errors as much as the heroism of 1848–49 would serve as education to all Italians in the near future.

Period IV.— Direct Action by the House of Savoy and Formation of United Italy (1849–70).—Austrian dominion over Lombardy and Venetia having been established by force of arms, Marshal Radetzky desired to render impossible any fresh attempts at independence, and spread everywhere fear and terror with his savage military action; and to this end he constantly caused the arrest, condemnation and punishment of citizens guilty of having taken part in the deeds of 1848–49, of having in their possession arms or patriotic publications or of having uttered generous sentiments concerning Italy. The result of this violent oppression was a new conspiracy, promoted by Mazzini, now an exile in London; this conspiracy had its centre in Mantova and was to prepare for a popular insurrection in Lombardy-Venetia in order to drive out the intruder and to establish the republic. At its head was the priest Enrico Tazzoli. Some traces of the plot having been discovered by the police, many persons were arrested whose names appeared on the lists of the conspirators; the prisoners were treated in the most infamous manner by the State Tribunal; and on 7 Dec. 1852, Tazzoli and four other patriots were hanged. Mazzini made speedy answer to this severity, inciting on 6 Feb. 1853 an insurrection in Milan, which was the cause of fresh condemnations and fresh punishments. The consequence was that the proceedings of Mantova were repeated, and ended with a decree that sent to the gallows other patriots. Austria, seeing that she would never succeed by violent measures in ruling the spirit of Lombardy-Venetia, tried to draw her to herself by more gentle measures; so the Archduke Maximilian was entrusted with the government of the Italian provinces. But it was now too late. On 15 Jan. 1857, upon the same day that the emperor with his wife entered Milan, the Milanese displayed their feelings toward him by dedicating to the Sardinian army a monument commemorating the first war of Italian independence, which was placed in the Piazza Costello in Turin.

Reaction raged also in other Italian states, especially in the kingdom of the two Sicilies, where the government of Ferdinand II was, because of its odious character, called by Gladstone a "denial of God." All those who had taken part in the movement of 1848–49 were frightfully persecuted at Naples and in Sicily.

Thus, between 1849 and 1859 there raged throughout the peninsula the most unjust reaction; but during this decade arose also a program for national redemption dictated in the hope of actual attainment, and there was one region in which the banner of liberty already waved and where that program was already approaching realization.

This new political policy, as well as that which had sought realization in 1848–49, was headed by Gioberti, who published a book about it in Paris in 1851 with the title 'Upon the Civic Rehabilitation of Italy.' In this work Gioberti, having learned by experience, had destroyed that part of his preceding program which had proved impractical, and had adopted that part of the program of Mazzini which was

practical, and presented the new political platform as the special task to be accomplished by the House of Savoy, which alone had demonstrated itself as capable and worthy of performing it; no more any Primate, no more papal supremacy, no more a confederation of princes, but the supremacy of Piedmont, the state to belong to the laity, the abolition of the temporal power of the Pope, unification with Rome as the capital. Such was the program by means of which they accomplished the Italian Revolution from 1859 to 1870 and from which emerged the new free state.

Victor Emanuel II (1820–78), king of Sardinia, who succeeded his father after the unfortunate day at Novara, had pledged himself to the statute with a faith which he always kept and which won for him the title 'Re Galantuomo' ("The Honest King"); and he dedicated his life to the triumph of liberty and to Italian independence. Reigning thus, with the help of his ministers at the head of whom were Massimo d'Azeglio and that great statesman Camillo Cavour (1810–61), he laid in Piedmont the foundations of a government absolutely liberal, national and progressive. They offered a generous hospitality to emigrants from all the other Italian states where reaction raged; since all were equal before the law, they abolished the Ecclesiastical Forum; they put through administrative, financial and economic reforms; they stimulated agricultural and industrial production and extended commerce; they reorganized and improved the army because it was obliged to sustain future trials. The king and the Piedmontese government exerted themselves for the representation of the entire Italian nation; when the war against Russia broke out in the East, the king of Sardinia allied himself with France and England, and the Italian army acquired much glory in the Crimea (1855), thus giving an opportunity and justification to Cavour to speak with authority in the name of Italy in the Congress of Paris with which this war closed. In order to prepare the way for harmony among all the Italians in the coming rehabilitation, the "National Society" was founded in Turin in 1857, and Cavour, since the campaign of 1848–49 had demonstrated that Italy could not act by herself, succeeded in establishing harmonious relations with the Emperor Napoleon III, obtaining from him a promise of help in driving the Austrians out of the peninsula. Victor Emanuel II, in opening a new session of the Subalpine Parliament (10 Jan. 1859), declared that he "was not insensible to the cries of sufferings" which were directed toward him from every part of Italy; and a few days afterward a treaty of alliance between France and Piedmont was arranged, which formed a fitting conclusion to a glorious decade and which was to give independence to Italy.

Napoleon III, descending into Piedmont with 110,000 Frenchmen, promised to make Italy free from the Alps to the Adriatic. The Austrians, having crossed the Ticino on 29 April, hoped to be able to defeat the Piedmontese before the arrival of their allies and to occupy Turin, but it was not possible. The French and Sardinians together were victorious at Montebello, Palestro and Magenta; and after that, the conquered enemy having withdrawn toward Mincio, Victor Emanuel II and Napoleon III entered Milan triumphantly on 8 June. These happy events caused the central Italian states to rise against their respective sovereigns — first Tuscany, then Parma and Piacenza, while Modena and Reggio, and finally Ferrara and Romagna, offered allegiance to the king of Sardinia and accepted commissioners appointed by him. In the meanwhile the war continued, and at Solferino and at San Martino (24 June) the allies were victorious in great battles; but the Emperor Napoleon III unexpectedly called a halt in the redemption of his promise, and on 11 July, for reasons not yet well understood, he concluded the armistice of Villafranca with the enemy, which armistice Victor Emanuel was regretfully forced to accept. By the terms of this armistice, followed in November by the Pact of Zürich, Lombardy was ceded to France, to be transferred to Victor Emanuel, and in central Italy those princes were to return who had been driven out, since the populace demanded their return. But this they no longer desired; therefore, hardly had the royal commissioners departed, when the people elected provisional governments which at once set to work to thwart any attempts at return on the part of the abdicated sovereigns. Napoleon was at last convinced that it was not possible to detach from Piedmont those regions which so earnestly wished to be united with her; but he wished a recompense, which was the cession of Savoy and of Nice (24 March 1860), granted in the treaty of alliance in exchange for the freedom of Lombardy-Venetia. Henceforth the kingdom of Sardinia included Piedmont, Lombardy, Parma and Piacenza, Modena, Ferrara, Romagna, Tuscany, Liguria and the island from which it takes its name; and this was the beginning of the present kingdom of Italy.

In the kingdom of the two Sicilies Ferdinand II was succeeded by Francesco II, a son worthy of his father. In the beginning of April 1860 a conspiracy gave rise to a small rebellion in Palermo, followed by other insurrections in various parts of the island. The time seemed opportune to Garibaldi to attempt the liberation of Sicily and of Naples. On 5 May 1,000 enthusiastic volunteers set out from the Rock of Quarto near Genoa, under his command and with the good will of the government and the king of Piedmont: they landed at Marsala, where Garibaldi assumed dictatorship in the name of Victor Emanuel II, king of Italy, conquered the Bourbons at Culatafini, entered Palermo after a brief struggle, and, his numbers constantly increasing, gained a decisive victory at Milazzo; and in a little more than a month the entire island was free. Henceforth, some small risings discovered here and there opened up the way for him; he landed in Calabria, and almost without a blow, was welcomed as a liberator everywhere. He advanced toward Naples, into which city, preceding his men, he entered almost alone on 7 September, the day after King Francesco II had fled to the fortress at Gaeta. At this point an event occurred which has been called the masterpiece of Cavour. The governments of Europe were much disturbed by the triumphs of the popular hero Garibaldi, which rendered the Italian Revolution so terrible. Cavour

thought that if the secular monarchy of Savoy, which up to this time had only assisted this expedition of Garibaldi's, should boldly assume the direction of it, it would not only add to its prestige in Italy, but would furnish the European powers with such guarantees of order as to render their intervention unnecessary. He decided, therefore, to come to the aid of Garibaldi. Having first traversed and captured from the Pope the Marches and Umbria in the victory of Castelfidario (18 September), the Piedmontese army entered Naples, where Garibaldi and his followers had won the battle of Volturno but had not been able to capture the fortresses which still resisted them. Victor Emanuel II and Garibaldi entered together into Naples. A plebiscite of Neapolitans and of Sicilians declared the desire of these regions to be united with the others, as they had been in the former state of Savoy; and Garibaldi, after he had presented the result of this vote to the conquered king, withdrew into his island of Caprera, carrying with him as the rich booty of conquest a sack of straw. In February 1861, the first Parliament of all the regions of Italy was assembled in Turin; on 17 March that law, which declared the kingdom of Italy constitutional was ratified, and on 27 March Rome, still in the possession of the Pope, was boldly proclaimed the capital of the new state.

When Cavour died (6 June 1861), only two provinces were lacking to make Italian unity complete — Venice and Rome — and all were agreed that these should be joined to the mother country. But since the government, following in the footsteps of the great minister, wished to proceed with caution, especially as regarded the question of Rome, in order not to draw down upon the head of the young king the resentment of Catholic Europe, many Italians under the inspiration and guidance of Mazzini and of Garibaldi, formed a so-called party of action, which wished to proceed more rapidly and without so much consideration for foreign susceptibilities. Attempts were made by Garibaldi to settle the two questions by force of arms. In 1862 the government was obliged to interfere, first, to stop the general at Sarnico, near Bergamo, since with his volunteers he wished to invade those provinces still held by Austria, and then to stop him at Aspromonte in Calabria, where he was advancing to take Rome from the Pope and then intending to free Venice. The final arrangements of the convention of September 1864 between France and Italy were much discussed; by its terms France was obligated to remove from Rome the garrison which had remained there since 1849, and Italy agreed not to attack nor to allow others to attack the Papal State, and also declared her willingness to move the capital of the kingdom from Turin to Florence. This change was made in 1865. In the meantime the liberation of Venetia was approaching, to accomplish which, Italy arranged an alliance with the kingdom of Prussia, which at this time appeared to be unfriendly toward Austria, her antagonist in Germany. In 1866 the two allies attacked their enemy at the same time, with the intention of entering Vienna to dictate there the terms of peace. But while the Prussians in Bohemia were victorious, the Italians, through mistakes of their leaders, met with two reverses, at Custoza on the land, and at Lissa by sea. So that they were obliged to consent to receive Venetia from Austria on the most humiliating terms and to leave Trentino, Trieste and Istria still in her power.

The liberation of Venice intensified the need and the desire to redeem Rome, also, and Garibaldi and his party of action set to work in the autumn of 1867. Bands of volunteers penetrated the Pontifical State (narrowed down to Lazio by the deeds of 1859–60), and while an insurrection was being arranged in Rome itself, they occupied Monterotondo. The insurrection failed; but notwithstanding a handful of 70 brave fellows, led by the Giovanni brothers and Enrico Cairoli, approached the city as near as the Villa Glori, where they were overcome by the Pontifical troops and killed or captured; and the French having landed at Civitàvecchia, because they insisted on the observation of the convention of September which had been broken by this unlucky invasion, Garibaldi betook himself to the mountains of Tivoli in order to prolong resistance; but having arrived at the basin of Mentana, he was here attacked and defeated (3 November) by the Papal troops and the French. This glorious defeat of the Italians had innumerable consequences, since the entire nation felt that it could not any longer endure that a foreign decree could withhold from them their rightful capital. They prepared, therefore, with zeal for the supreme moment, which was not slow in presenting itself. When the Ecumenical Council of the Vatican in 1870 had proclaimed the dogma of the infallibility of the Pope, and the Franco-Prussian War had caused the downfall of Napoleon III, the Italian government held itself freed of the obligations which it had assumed personally with the emperor through the convention of September, and it decided to act. First it attempted to induce Pius IX to open the gates of Rome in a friendly way; upon receiving a refusal of this request, it was decided to use force. An army commanded by Gen. Raffaele Cadorna (20 Sept. 1870), made a breach in the wall near Porta Pia, entered the city and was warmly welcomed by the population. The Pope made protest and declared himself a prisoner of the Italian Revolution; but on 2 October, a plebiscite of Romans consecrated the union of Rome with Italy. The Parliament in Florence in 1871 passed a law guaranteeing the papal security, and thereupon the capital was transferred into the free city without any opposition on the part of the Catholic powers, and Victor Emanuel II could declare "we are at Rome and there we shall remain," and Quintino Sella could say "*hic manebimus optime.*" This unification of Italy was the realization of the dream of Dante, of Machiavelli, of Alfieri and of the myriads of martyrs who from 1815 to 1870 sacrificed themselves for their country. Italy had completed one of the most important efforts for liberty and for human progress; and in the years to come she could expect the development of her own resources and consequently that prosperity and that grandeur which had been prohibited for so many centuries.

Period V.— Development and Progress of Free Italy (1870–1907).— The various members of the country being brought together in one body, the Political Resurrection was necessarily followed as a natural consequence by

an economic, intellectual and social Resurrection. All power after 1870 remained in the hands of that party which had had Cavour as master, and which had had the wisdom to guide Italy to unification. But this party, because of its oligarchial tendencies, lost its majority in Parliament and in the country, and political power passed in 1876 into the hands of the progressive party, which kept it for several years and did many good things, such as the extension of electoral rights and the abolition of the most distasteful taxes. Then the Right and Left became mixed and confused and there were no longer distinct parties with different programs. In 1862 occurred the death of Mazzini, who had been the first to preach to the nation its duty to unite; in 1878 Victor Emanuel II died in Rome, the man who had realized that which Mazzini had thought, and whose sepulchre is the Pantheon. During the reign of Humbert I (1878–1900) the liberal institutions continued to develop with order and regularity, and socialism, which was spreading throughout the country and sent its representatives to the Chamber of Deputies, was spurred to reform. Its representatives were instrumental in passing laws to improve the administrative, judicial and financial regulations; they provided for public hygiene; they protected the rights and the interests of the laboring classes, establishing obligatory insurance against accidents to the operatives, and limiting the hours of labor for women and children, founding a pension bureau for artisans, etc. Two very important events took place during the reign of Humbert I: the stipulations of the Triple Alliance and the acquisition of colonies in Africa.

Pius IX and his successor, Leo XIII, did not give up the pretense of still possessing temporal power and threw obstacles of every kind in the way of the reign of the so-called usurpers. In France the republic was not yet upon a firm foundation and might at any time fall into the hands of the clericals, who were in favor of pontifical vindication. To this should be added the occupation of Tunis, made provisionally by France in 1881, which awakened great wrath south of the Alps. Italy believed herself in danger; and at the same time Austria threatened her from the other side, because she was irritated by the agitations of the Italian party, called the Redemptionists, who desired the speedy liberation of Trentino, Trieste and Istria; they felt the need of relying upon Germany, which was already united with Austria; and thus in 1882 arose the Triple Alliance (see under ITALY — HISTORY FROM 1907 TO 1919). Later, her wrath being appeased, Italy again approached France, and her consequent agreements with this power and with England safeguarded her interests in the Mediterranean.

Her colonial possessions in Africa commenced with the acquisition of Assab in 1882, then with the occupation of Massaua in 1885. Wishing to occupy the high plateaus in Ethiopia, the Italians came into conflict with Emperor John of Abyssinia; but he, after a victory at Dogali in 1887, was forced to withdraw. Some years afterward, Italy wished to exercise a sort of protectorate over the new Emperor Menelik, because of her occupation of some territory; he refused and war again broke out and this, after some honorable defeats for the Italians, ended with the disastrous conflicts of Adua and of Abba Garima (1 March 1906). Thus the dream of a vast African Empire vanished, and Italy was obliged to content herself with a more restricted territory, called Colonia Eritrea, which is being peacefully developed with hopes of a prosperous future. Besides this colony, there have been acquired upon the shores of eastern Africa the colonies of Somalia (Somaliland) and Benadir, and upon the northern (Mediterranean) coast territories acquired as a result of the war with Turkey. (See under ITALY — HISTORY FROM 1907 TO 1919).

The reign of Humbert I had a tragic ending. In consequence of a serious disagreement between the ministry of Gen. Luigi Pelloux, which wished to restrict certain liberties, and the more advanced party of the Chamber, which defended them, a conflict which became most acute and which at length reached obstructionist tactics and produced great resentment, an Italian anarchist left the United States, in order to revenge upon the king the retrogressive attempts of the Minister, and killed Humbert I at Monza 29 July 1900, awakening horror against the murderer and sympathy for the victim throughout the entire world. His young son, Victor Emanuel III, ascended the throne; he had been educated with the greatest care in regard to his exalted position, and he has proved that he respects liberty and is worthy of the esteem and affection of the Italians.

This nation, which has already given two civilizations to the world, when her redemption from foreign oppression and her own unification commenced, could already in certain aspects stand upon equal footing with the most progressive of the civilized nations, but in others she was inferior to all. In fact, even in those centuries of slavery Italy was always the country of science, literature and art; but in those same centuries her economic conditions were deplorable. Liberty not only made it possible for her to preserve those requisites which she already possessed, but also put her in a position to acquire those which she lacked. In science, the national genius which had produced Leonardo da Vinci, Galileo Galilei, Allesandro Volta, and many other distinguished persons, continued to manifest itself; to mention only the principal names, there were the astronomers Angelo Secchi (1818–78) and Giovanni Schiapparelli (1835–1910); the great psychologist, Cesare Lombroso (1836–1909), founder of criminal anthropology; the physiologist, Angelo Mosso (1846–1910), and the electricians Galileo Ferrario (1847–97), who discovered the rotary magnetic field, and Guglielmo Marconi (1875——), who gave us wireless telegraphy; the philologist Graziadio Ascoli (1829–1907), the chemist, Stanislav Cannizzaro (1826–1910), the mathematicians Eugenio Beltrami (1835–1900), Luigi Cremona (1830–1903) and Giuseppe Veronese (1854——). In letters, the country of Dante, of Petrarch, of Boccaccio, of Machiavelli, of Ariosto, of Tasso, after having seen her redemption assisted by the works of so many famous authors, whom we have already mentioned, having become free could already boast of writers like Giosuè Carducci (1836–1907), Edmondo de Amicis (1846–1908) and Gabrielle d'Annunzio (1862——). In the fine

arts, of which Italy had produced for many centuries so many masterpieces, it was difficult to keep herself on the heights to which she had formerly risen and to which so many other countries had arrived. Especially in architecture are there many examples worth mentioning, as regards originality, grandeur and purity of style, for instance,—the Gallery Victor Emanuel in Milan by Giuseppe Mangoni (1827–87); the National Museum of Italian Renaissance in Turin, called Mole Antonelliana from its author, Alexander Antonelli (1808–88); the monument to Victor Emanuel in Rome by Giuseppe Sacconi (1854–1905). In painting, we may mention, as among the most illustrious, Domenico Morelli (1826–1901), Giacomo Favretto (1849–97), and Giovanni Segantini (1858–1900). In sculpture those worthy of mention are Giovanni Duprè (1817–82), Vincenzo Vela (1822–91), and Giulio Monteverde (1837——). In music, after Rossini, Bellini and Donizzeti, who attained their greatness during the period of struggle for Resurrection, Giuseppe Verdi (1813–1901) continued his admirable productions, and Pietro Mascagni (1863——) commenced to make himself heard of, as well as Ruggero Leoncavallo (1853——), Giacomo Puccini (1858), and Umberto Giordano (1870——).

More difficult than the preservation of Italy's former importance in the scientific, literary and artistic world was the beginning of economic importance. The energy which liberty developed in the inhabitants, especially in the northern parts, and the provisions of the state rendered possible many great public works, destined for the progress of agriculture, of industries and of commerce; for example, the redemption of marshy lands in Ferrara and near Rome; the colossal aqueduct of the Puglie; the tunnels of Cenisio, Saint Gottard and the Simplon, which it is intended to follow by those of Spluga and Montebianco (Mont Blanc); the construction of railroads, which on 30 April 1915 extended a distance of 11,337 miles; the regulation of the harbors, among which Genoa bids fair to become the foremost on the Mediterranean. Industries which had never existed before now appear and prosper from day to day; in some lines, for instance in weaving cotton cloth and silk fabrics, in the construction of automobiles, Italy does a large export business. The Alps which surround the peninsula, and the Apennines which traverse it, furnish in their streams cheap and abundant electric power; which will constantly lessen the amount now paid for the importation of coal. The country does not yet produce all the wheat which it needs, but agriculture is constantly progressing. The population has increased notably, and 4,000,000 Italians work in foreign countries, from whence they contribute their savings to add to the national wealth. If all the regions of the kingdom, in industries, in commerce, in agriculture, in the diffusion of popular education, should arrive at that degree of efficiency to which the northern provinces and a part of central Italy have risen in less than half a century, Italy would in these aspects also stand on an equality with any of the most progressive nations. What she has been able to accomplish in spite of the enormous difficulties created by her peculiar conditions, was well seen in the International Exposition held in Milan in 1906 to celebrate the opening of the Simplon tunnel.

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7. HISTORY FROM 1907 TO 1919.

Four years of industrial expansion followed; and it is quite proper to say, with more emphasis than in the foregoing study, that in Rome and in Turin at the celebration in 1911 of the 50th anniversary of the foundation of the kingdom of Italy and the proclamation of Rome as its capital, we saw what Italy had been "able to accomplish in spite of the enormous difficulties created by her peculiar conditions." From the Tiber to the boundaries with France and Switzerland the peninsula was comfortably crowded with visitors from all parts of the world who came to see novel products of the 20th century as well as treasured products of all the 19 or more preceding centuries. It was in the same year that Italy undertook the annexation of Tripoli, sending her ultimatum to Turkey on 27 September. The Italo-Turkish War continued until 18 Oct. 1912, when by the Treaty of Ouchy, the sovereignty of Italy in Tripoli was practically established, and Italy, for her part, promised restoration of the Ægean Islands to Turkey and payment of a part of the Ottoman foreign debt which was guaranteed by Tripoli and Cyrenaica revenues. On 5 Dec. 1912 the Triple Alliance was renewed and extended until 8 July 1920; this, however, was an arrangement far from satisfactory to patriotic Italians enlisted in the popular "Italia irredenta" movement (irredenta, unredeemed, lacking liberty). It has been well said that the avowed object of that movement was "to incorporate in the Italian monarchy territories in the southern Tyrol and Trieste on the ground that they are largely inhabited by Italians." The movement has been exceedingly popular in Italy and Italian cabinets have squared their policies with due regard to the popular demand in recent years. Having this in mind, it is easy to understand that upon the outbreak of the war in 1914, demands were made by Italian "Irredentists" that the government should not neglect the opportunity presented to take at least Trent and Trieste for Italy. But for a long time the government refused to be persuaded either by the progressives at home or by the old associates beyond the Alps. Inasmuch as Italy "had not been consulted in negotiations leading to the Great War, she decided to remain neutral and not join Germany and Austria. This attitude of Italy was of great value to France

because no troops were necessary to protect the Italian frontier.» The attitude just referred to underwent a change during the year 1915; popular sentiment in Italy inclined more and more strongly in favor of the cause represented particularly by England and France—powers that had especially through restraints imposed upon Moslem elements in Egypt, Tunis, etc., given proofs of friendship for Italy in 1911–12; and on 3 May 1915, after adherence through a generation to the Triple Alliance, Italy renounced her treaty, so far as it controlled her relations with Austria-Hungary. The statement of Green Book, number 76, is that «Italy, confident in her good right, affirms and proclaims that from this moment, 3 May, she resumes her entire freedom of action and declares her treaty of alliance with Austria-Hungary to be void and henceforth of no effect.» On 23 May, Italy declared that she considered herself in a state of war with Austria-Hungary from 24 May because that former ally obstructed the long-sought opportunity of realizing her geographical aspirations. The subsequent Italian campaign was marked by the absence of great or striking events, simply because the strength of the Austrian military positions along or near the international boundaries (strictly artificial and political, rather than geographical or ethnographic) «made Italy's task one of tremendous difficulties.»

On 13 and 14 Jan. 1915 there were severe earthquakes in the Avezzano region and central Italy generally; 16 towns were completely destroyed, with the loss of 30,000 lives and of property valued at $60,000,000. On 7 Nov. 1915 the Italian steamship *Ancona*, when one day out on the voyage from Messina to New York with more than 400 passengers and a crew of about 170, was attacked by a submarine flying the Austro-Hungarian flag; and, according to the American note of 6 December, «By gunfire and foundering of the vessel a large number of persons lost their lives or were seriously injured, among whom are citizens of the United States.» An influence too powerful within the country's limits to be overlooked in this sketch was that of the Socialists who in 1915 had 79 deputies and over 1,160,000 votes. The Socialist party openly opposed the war. On 9 March 1916 General Piacentini was appointed commander of Italian troops in Albania; General Cadorna was commander-in-chief on all fronts. On 21 March 1916 the government announced to the Chamber its firm adherence to the London convention. On 8 June 1916 the Imperial Appeal Court at Leipzig, in a dispute over contract, handed down a verdict declaring that war existed between Italy and Germany, actually though not formally. On 28 Sept. 1916 the German Imperial Chancellor, Dr. Von Bethmann-Hollweg, asserted in the course of a speech in the Reichstag that the Entente powers made uninterrupted efforts to cause Italy to declare war; that for more than a year the Italian government resisted, but finally measures employed by England were so strong that Italy had to yield; that the decision was brought about by British coercion; although Italian hopes in regard to the Balkans also exercised influence. In point of fact, England had secured, and fairly earned, Italy's gratitude, respect and confidence. At first successful in the campaign against her ancient enemy Austria, near the close of 1917, the Austro-German army attacking in force, inflicted a disastrous defeat on the Italian army under General Cadorna, until checked at the Piave River. This defeat resulted in a severe arraignment of the Boselli ministry which led to its downfall 25 Oct. 1917 and a new ministry under Signor Orlando succeeded on 31 Oct. During 1918 under General Diaz, the Italian army began its victorious onslaught on the Austro-German forces driving them back and finally capturing Trent, Trest and Udine, the chief Austrian base in Italy. A total of 300,000 prisoners and 5,000 guns were captured and the Austrians asked for and accepted armistice terms 4 Nov. 1918. See ITALY AND THE WAR; WAR, EUROPEAN.

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8. POLITICAL ADMINISTRATION.

General Characteristics.—In order to understand the political character of the administration in the kingdom of Italy, we must take into consideration certain essential elements of her Constitution, determined by her political history and by the manner of the formation of the Italian kingdom. The reaction against the secular division of Italy into a number of more or less insignificant states, none of them strong and all more or less at enmity with each other, determined the formation of a government that should not only be rigorously unified, but absolutely concentrated. There should be not only one source of sovereign power, but also the greatest possible concentration of power in the central authority. Thus the original type of Italian administration was molded to a perfect similarity to that of France before Napoleon. Meanwhile, the broadly liberal spirit in which the Italian Constitution was applied and interpreted, and the domination of democratic influences, rapidly led to a full and absolute adoption of the parliamentary system, by which the Cabinet is responsible in Parliament for the acts of the Crown, and the Parliament exercises a direct and constant influence on the proceedings of the public administration, either in virtue of the ever-widening and increasing scope of its legislative functions, of the annual acceptance of the budget, or of what, strictly speaking, may be

called the inspectional function (*interrogazione, interpellanza ed inchiesta*) and the power of censuring the Cabinet and instigating dismissal from office.

In a unified and concentrated government, which is at the same time a parliamentary government, and as such subject to the rule of the majority or of parties, the influence of politics with all its menaces and all its perils on public administration, seemed almost inevitable. The Italian government is certainly not free from this accusation. But the gravity of these dangers was fully foreseen, and determined a reform government with the view of avoiding or diminishing them. Corresponding to this was an ulterior phase of administrative development in the Italian government which, in the field of science, encountered the influence of the German theories on the jurisdiction of government and on the judicial auto-limitation of the powers of the state as a guarantee not alone of political, but also of the civil, rights of the individual. Thus, while according to the statute the right of appointing or removing officials belongs to the head of the executive, successive rulings gradually limited this power so as to make it little more than a formality and subordinate it to a multiplicity of limitations and privileges; thus the discretional powers of the public administration were regulated and disciplined with great strictness; thus a series of very severe inspections in administrative laws, judicial ordinances and parliamentary ordinances. Perhaps, taken altogether, the government of Italy has to fear the dangers of weakness rather than those of violence and absolutism. The truth is that Italy has had too brief an education in the hard school of freedom; she is still passing through periods of transition, and has not yet conquered all the phases in the perfect formation of an administrative organization.

Direct Administration of the Government. —The outward and formal affirmation of the unity of the administration is in the head of the kingdom. According to Art. 5 of the Statutes of the Kingdom, "To the King alone belongs the executive power." Art. 5 affirms further that the king is the supreme head of the state, commands all the forces on land and sea, declares war and has control of the foreign policy of the kingdom. The king makes appointments to all the offices of the government and makes the decrees and ordinances for the execution of the laws (Art. 6, Stat.).

With the parliamentary form, however, of the Italian government all these prerogatives of the king are always exercised subject to the responsibility of the Ministry, either collectively (the Cabinet), or individually according to the nature of the act.

The responsible representatives of the government are therefore the Ministries; and in Italy they have a double function: constitutional on the one hand, in which they assume the responsibility of the acts of the Crown before the Parliament; administrative on the other hand when they take the active direction of an important branch of public administration. There are 11 branches of the Ministry in the Italian government: (1) The Ministry of the Interior, which is really the political ministry par excellence (on it are dependent the departments of police and of public sanitation, the local government offices, the communal administrations, the prisons, etc.); (2) the Ministry of Foreign Affairs; (3) the Ministry of War; (4) the Ministry of the Navy; (5) the Ministry of Public Finance; (6) the Ministry of the Exchequer (which administers the wealth of the kingdom and represents the financial economy of the government); (7) the Ministry of Justice and Religion (which is supreme in all jurisdictionary and ecclesiastical matters). Then come the departments of social administration; (8) the Ministry of Agriculture, Industry and Commerce; (9) the Ministry of Public Works (which comprises also transportation and railroads); (10) the Ministry of Public Instruction; (11) the Ministry of Postal Communication and Telegraphs. The supreme organ in the councils of the government, intended to give advice to the Ministers, without, however, limiting their freedom or responsibility, is the Council of State, besides the special supreme councils which are instituted in the various Ministries for the discussion of special matters.

The direct administration of the government—emanating from the ministerial centre —is felt throughout the whole territory of the kingdom by means of a network of local government officials, co-ordinate and subordinate. Every special administration has, naturally, its special territorial organs; but even in this diffusion of the administrative action it has been the object to maintain a sort of sub-central unity, by the institution of a suitable official who should represent all the powers of the government within a certain extent of territory. This office is filled by a prefect, within a circumscribed area known as a province; the kingdom is divided into 69 prefectures. The prefect, according to Art. 3 of the Communal Law, represents the executive power in the whole province, provides for the execution of the laws, supervises the conduct of all the public government offices, superintends the safety of the public, has the power to make use of the police force, and to call out the soldiery. Thus, all the provincial government officials find their unit of co-ordination in the prefect, who upholds and confirms their subordination to the managing official of the Ministry. The judicial representation of the central administration is also assured in even the smallest section of territory, for in every commune the mayor (besides being the head of the communal administration, as we have said, is also empowered to represent the government, especially in whatever regards public safety, the police department and local sanitation.

The Administrative Departments and Public Offices.—The unification of the Italian administration is specially shown in the bureaucratic and departmental organization. All the offices of the government are united by a chain of obedience which mounts gradually from the lowest to the highest, from the local to the central government, up to the supreme head of the administration, i.e., the king. The administration, except in certain very unusual cases, is bureaucratic, i.e., consists in paid individual responsibility of public functionaries who are at the same time professional employees. In Italy there is no general law on the judicial status of employees. There are, however, sev-

eral special laws and a lengthy and complex series of special regulations, forming, as one may say, a species of common law regarding public employment. The appointment of public employees is generally through competitive examination, and in this way the various grades do not depend on the arbitrary whim of their superiors. The exceptions to this rule are in the case only of certain official positions that are pre-eminently political, and especially that of prefect.

Local Administration.— The antecedent history of the Italian government gave rise from the first to a spirit of mistrust of the local autonomies, ill concealed by purely external and formal recognition of an auto-administration to a great extent democratic. This led to the breaking down of all connection with those great natural divisions of territory which in Italy were formed by regions many of which had a real and true geographical autonomy (such as the large islands of Sicily and Sardinia), and others a parallel in antecedent history in the usages, customs, dialect (as in the ancient kingdom of Naples, in Tuscany, Piedmont, etc.). The whole territory of the kingdom was instead divided symmetrically into communes which were given a uniform government, without any judicial recognition of the difference between large cities and small communes, between industrial and rural centres, etc. An aggregation of communes constituted a province (which is at the same time the circumscribed section under the local authority of the prefecture, as has been previously mentioned). There are 69 provinces, and the average population of each of these amounts to about 500,000 inhabitants, but in actual fact the number and density is variable. Only occasionally the province is identical with the region (for example, Umbria and Basilicata); in general, every region comprises several provinces (Sicily, seven; Sardinia, two; Tuscany, eight; Piedmont, four, etc.).

Thus the communes which the provinces may juridically retain as self-governing bodies are territorial corporations of which the government makes use as organs of its administration; while, at the same time, they represent and take charge of the collective interests of the corporation itself. It follows that these corporations, as far as their activity in the field of public administration is concerned, have never any original rights of their own, but act in virtue of a delegated legislative authority, and use the powers transmitted to them by the government.

The legal limit of their autonomy is found in the normal functions of vigilance and control which the government (through the instrumentality of the prefectures and the Ministry of the Interior) exercises over the local bodies, reserving to itself the right of annulling in these communities such enactments as might prove contrary to the laws and outside the limits of their right (*competenza*). By certain enactments (but not as a law), the government exercises a real guardianship over the communal administrations, looking into their very actions with the consideration of their expediency and utility. The organ of this guardianship is a college of seven members, partly honorary, partly official functionaries, called the Giunta Provinciale Amministrativa (Provincial Administrative Assembly).

The communes and the provinces, according to a general law, do not exercise any of the activities of political organizations, but only the economic and social institutions, particularly transportation, public instruction, hygiene and local police, and the assistance of the poor. Some of these services are made obligatory on them by law; others may or may not be instituted at discretion. An insuperable obstacle to this theoretical liberty is doubtless, however, the lack of financial means. The local Italian administrations have no true and individual financial autonomy: the principal income from taxes is the exclusive appurtenance of the government, which leaves to the communes only a quota of the amount within certain limits. A law of 1903 permits the communes to assume the direct management of commercial or industrial enterprises that have a bearing on public interests and constitute to a certain extent natural monopolies (aqueducts, public and private lighting, tramways, telephones, mills and furnaces, public baths, etc.).

As regards the constitution of the communal representative bodies, the Italian law is sufficiently comprehensive and democratic. In all communes there is a deliberative body which sets forth the will of the community in matters of serious importance, and the communal council (in the provinces, the provincial council) composed of a number of citizens (from 80 to 15, according to the population of the commune) nominated by the popular vote of the majority. All citizens are entitled to vote if they pay into the commune any kind of legal tax, provided they know how to read and write, and those who, having their domicile in the commune, shall be absolved from the obligation of elementary instruction. As a rule no direct interference by the assembly or by popular vote was permitted in the management of communal affairs; but, lately, the law on the municipalization of the public utilities insisted that the deliberations of the communal council which resolved to assume the service should be put to the vote of the electors of the communes (referendum).

The mayor is the head of the communal government and the organ of its active administration. He has, at the same time, as above mentioned, the dignity of a functionary of the central government. In spite of this complex position, his appointment is entrusted to the communal council, who elect him from among their number. The governor has the power to recall him from office as he has also the prerogative of selecting the communal council and of placing the administration of affairs in the hands of a commission in extraordinary until the next election and for a period not exceeding six months. The mayor is assisted in the exercise of his official functions by a body (giunta) of lawyers (assessors) elected also by the communal council. The provincial council elects a provincial deputation which, with its president, is the organ of the active administration of the province itself.

Jurisdictionary Inspection.— Besides the parliamentary jurisdiction over the entire administration of the kingdom of which mention was made (notably the practical drawing up of the obligatory balancing of expenses and the

sum allowed by the government, which is controlled by the Corte dei Conti), Italian public law has ordained a series of mutual inspections (*controlli contenziosi*), which are yet strictly jurisdictional.

The law of 1865 gives to the ordinary tribunals the power to reinstate in his rights the citizen who has been wronged by an act of the public administration, abolishing the ancient government courts of *controlli contenziosi*, which formerly existed, modeled on those of France. This full judicial power is, however, subordinated to two conditions: that a true and inherent subjective right of the citizen should have been infringed; that the sentence should be limited to the recognition of the wrong suffered in the specific case, without the ability to revoke in itself the administrative act. Thus much in regard to the theory of the distinction between powers, which, although it has been discussed and is capable of discussion in the abstract, remains one of the positive accepted unwritten laws of the Italian Constitution. To offset the lack of protection of the legal sphere of individual interests caused by these limitations, a law of 1888 established a high tribunal of administrative justice (creating a special section of the government council) which, with all the forms and guarantees of legal procedure in *contradictorio*, adjudicates on the objective legality of the acts and provisions of the administration, it being sufficient that the citizen should prove that not necessarily a law but a legal privilege has been impaired by this act. The council of the government in the seal of administrative justice has the privilege of annulling the impugned administrative decree. For the settlement of disputes that may arise between the government authority and the judicial authority, the supreme tribunal is the highest court in the kingdom — the Court of Cassation in Rome.

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9. THE CROWN AND PARLIAMENT.

The nature of the relations between the ruler or head of the state and the Parliament is the best guide in determining the character of a representative government. These relations are harmonious in the constitutional systems of Prussia and of the German Empire; inharmonious in the republics; distinctive in England, Belgium and Italy.

The note of discord is formed by the Cabinet, when that Cabinet represents the intermediary between the ruler, or head, and the Parliament. From the historical point of view representative governments which have been formed through royal concessions recognize in their statutes the predominating influence of the sovereign, who is the centre of gravity of the state; and although these Parliaments have distinct power they yet consider him the head who inspires them and ordains their powers and the limitations of those powers. But this can only be a transitory state of affairs. Liberties, though they have the appearance of concessions, are no longer revocable; the suffrage is being gradually extended and the influence of the popular assembly on the action of the government is ever on the increase. There may be a more or less prolonged period of resistance on the part of the Crown, but parliamentary government, expressing the will of the people, will finally triumph over the constitutional form.

THE CROWN.

This brief general statement will aid us in understanding the origin, the historical and constitutional value of the Crown, in its relation to the character and to the proceedings of the Parliament in Italy. We can then, in bolder lines, portray a double period which corresponds to the gradual development of our political organization. This political organization in its dynastic concessions resembles a charter; as regards its title, its form, it is a statute; as regards the spirit that prompts it, the manner in which it has evolved, it is a true constitution on a parliamentary basis. In its outward and superficial appearance it differs little from other statutes in which, as in Prussia, the ruler of the state is the head of the executive.

In Italy the statute has not the restrictive authority that it had in France in 1814, in Prussia in 1850, in Austria in 1867, all of which represented royal concessions; and yet it still suggests the old absolutism in many particulars. To the Italian statute, as regards jurisdiction, the same standard cannot be applied that political science suggests in the examination of other constitutions. A scientific analysis will show that a statute conceded by royal initiative must have a special character. The king thought that by creating the organization necessary for political government he would restrict his own power; but he really in this way ordained that such matters as referred to the exercise of power or freedom should be regulated by law.

This complication of regulations, restrictions of written (codified) principles forms a series of limitations that the head of the state has placed on his own actions, and which is analogous to the restrictions which the executive lays down by decree and ordinance. Without this we could not explain the provisions which do not come under the ordinary classification of the three forms of government. We shall merely cite the various forms of the *Jus Imperii* which daily become more comprehensive, and avoid the civic as they do the legal authority. These provisions, which assumed the form of royal decrees, represented the exercise of the highest sovereignty, and had some analogy with the orders of the Privy-Council in England; but on the other hand they must not be confounded with the royal enactments, such as those permitted by the charter of 1814 in France, which cost Charles X his throne and overthrew the Polignac Ministry, or with that which authorized the decree of May 1882 in Prussia.

It would be natural in Italy to expect a similarly enlarged sphere of royal authority which would appear to detract from the reality of parliamentary government. And in the pre-

liminary period of our constitutional history we have not a few instances of such a condition of affairs. But through the natural evolution of parliamentary government the rights immediately belonging to the Crown were preserved, and all the rest were included in the responsibilities of a ministry directly responsible to a House of Deputies elected by the people.

The manner of procedure in the law of necessity, which comes up in extreme cases before any government, whether monarchist or republican, has not been clearly defined. The proclamation of a state of siege depends, in substance as well as form, on a royal decree which, although countersigned by all the members of the Cabinet, does not guarantee it from possible abuses. While preserving to the executive the right of action by means of decrees, the limits of such a law of necessity should be fixed by means of laws such as they have in France and Germany; or better still, by the English method, which requires the intervention of Parliament.

The Italian statutes contain various dispositions in regard to the prerogative of the Crown, namely, the mass of guarantees ordained to maintain the prestige of the Crown and its preeminence over a representative government, such as: the hereditary character of the Crown according to the Salic law (art. 2); the inviolability of the person of the king (art. 4); fixing his majority at 18 years of age (art. 11); the allowance to the members of the royal household; the regency, etc.

The royal income, the successive increments to which accruing from the annexation of the various Italian states to the old kingdom of Piedmont, in regard to which there were about seven laws on the civil list, from 16 March 1850 to 31 May 1877, besides the last one decreed by King Humbert, corresponds almost to the permanent government expenses in England, and is free from parliamentary control. Its administration is autonomous and precludes all interference by either chamber.

The Minister of the Royal Household, according to the decree of 14 Nov. 1901, is nominated by the suggestion of the Council of Ministers, but has no responsibility towards the Parliament. The prerogatives constitute the traditional element, whose precedents extend far back in the limited monarchy, as in the absolute. But there is another element — impersonal and non-statutory, but with a political significance and history connected with the state and with modern society. This is the most difficult matter the Crown has to contend with because it is relative to its *raison d'être* with regard to the democracy.

The Crown in Italy resumes all the chief characteristics of the parliamentary monarchy. Hence, in spite of diversities of origin, of customs and traditions, it resembles by analogy those of England and Belgium. A more profound observation of the acts and functions of the king has established the fact that a parliamentary monarchy will find its *raison d'être* in an elective principle, although the form be hereditary. History gives instances of this. The transition from the constitutional to the parliamentary form was determined in England in 1688 by solemn Act of Parliament which deposed James II and put in his place William of Orange.

In Belgium the new monarchy arose by elective act of Parliament, after separation from France and the proclamation of a constitution in 1831.

In France the Crown underwent a profound transformation which distinguished the declaration of 1814 from that of 1830, when the Parliament proclaimed Louis Philippe king of the French. The same character was seen in the dynasty of the Second Empire: Louis Napoleon was elected emperor in 1852 and called a plebiscite in 1869.

The Crown in Italy has a special hereditary character through its historical traditions, but in virtue of the annexations and of the plebiscites has been invested with an elective character, which is reflected in its actions; whence the constant and effectual support which it has given to the democratic evolution of the Italian Constitution. Within the limits of the Constitution the king, free from all restrictions, has the right to ameliorate the various organizations of the state. This is shown by the foreign policy; the authority to form alliances, to enter into agreements with foreign nations, to form a government, to renew the Parliament, to convoke the assembly.

These eminent prerogatives are distinct from the functions that the king exercises with the co-operation of the other functionaries of the government, which may be called co-operative functions:

(1) Co-operation with the legislative power in regard to the royal decree for the presentation of all the laws projected by the ministry, and to the sanction of those laws; for once they are voted on by the Chamber and the Senate, they become law. In theory the king's veto is absolute, but its peremptory character does not hinder the passage of a law, in fact this right has never been exercised. The method of veto granted to the President of the United States answers the purpose better, and has a beneficial influence in allowing time for the amendment of many important laws. It would be advisable to introduce it in Italy where the lack of a mixed commission prevents any means of adjusting the want of unanimity in the two chambers, and thus leads to an acquiescence which is harmful to the efficiency of the laws.

(2) Co-operation with the executive power in the nomination to all the offices of state, which presupposes always a preference designated by the government, which is responsible for its nominee. This series of mutual relations does not include (at least in form) the initiative of the king even in making those nominations which seem to pertain exclusively to his prerogative, for instance, the nomination of senators. This, properly speaking, is his special right, in regard to the members of the government, and has also to be subscribed by responsible ministers.

(3) Co-operation with the judiciary in whatever else belongs to the power of nomination; the power of pardon and of amnesty.

The distinctive feature in a parliamentary monarchy was constituted in Italy by the Cabinet, the choice of whose members depends on the free will of the king. According to the letter of the statute this privilege is absolute (art. 67); but in practice it has been modified to suit the conditions of Parliament and the

country, in accordance with the best traditions of England and Belgium.

In the preliminary period, from 1848–60, the king had a greater power of initiative. His prerogatives savored of the original character of the statute which was a concession by the Crown; and the exercise of those prerogatives was a complete success, especially in the choice of the Prime Minister, Count Camillo Benso di Cavour, whose direction of Italian politics and their functions, seconded by King Victor Emanuel II, led to the independence and unity of Italy. With the new kingdom, the national representation became of more value, the selection of the Cabinet was made the choice of a majority, and depended on the political votes of the Chamber of Deputies. This proper method has been followed until the present time by the king, who thus maintains himself superior to all parties, and can adapt himself to the exigencies of public opinion.

In the exercise of the right of choosing the members of the government is also comprehended the power to refuse any such nominees if the Crown thinks that the legal majority in Parliament does not correspond to the royal majority throughout the country. Thus it happened that in 1864, after the sad cases in Turin which provoked a violent repression on the part of Minister Minghetti, subsequent to the convention of September, at which the capital was transferred from Turin to Florence, the king demanded the dismissal of the Cabinet, although it had a majority in the Parliament.

In several cases the Crown has not been willing to accept the retirements caused by hostile votes in the Chamber of Deputies, but it is a right which must be exercised with discretion, and it is always connected with the power of appeal to the country.

Collecting together the various solutions of the crisis during a period of 58 years it will be found that the Crown exercised greater freedom in the choice of ministers under Charles Albert and Victor Emmanuel II; that in many instances it used the power of discretion under King Humbert, and that it conforms strictly to the designation of a parliamentary monarchy under the present government.

The Parliament.

Although the Parliament with its two Chambers in its construction resembles that of France in 1830, it is different from the latter in its evolution of more liberal customs.

The Chamber of Deputies, composed of 508 members, begun on a restricted electoral basis, acquired a democratic character after the reform of 1882, which established a limited membership, with the requisite of elementary education. This reform still has an influence on the formation of the parties. From the first these took the name of Right and Left; the former, the party of order, had the predominance until 1876, and endeavored to bring about national unity and to establish financial equilibrium, and to proclaim the secular attitude toward the papacy; the latter, as the party of action, endeavored above all to promote the more democratic tendencies and to improve the economic condition of the country. But these two parties subsequently became subdivided into groups which made the formation of a Cabinet of harmonious members very difficult, particularly when, in latter times, a strong group of socialists entered the Cabinet, in 1900.

The Upper Chamber, although founded on a basis of life tenure, consists largely of high officials. It has always maintained a liberal attitude; and even if it has sometimes opposed administrative reforms it has never attacked more important political reforms. This connection between the two branches of the Parliament has helped to modify many provisions of the Senate. In 1916 there were 416 members of the Upper Chamber, including the six who were also members of the royal family.

The Senate, compared with the other Chamber, has more restricted attributes in regard to finance, although in practice it has several times exercised the power of amendment. It retains special judicial functions as ancient traditional survival of preceding statutes. It may in fact constitute itself a high court of justice for the consideration of cases of ministers accused by the other Chamber, and also for cases of political crime and where its own members are accused (Statute, art. 36). It may accept in the first case the special judicial function (which is paralleled in the American Senate in regard to impeachment of the President, but it cannot be justified in the other two cases, which savor of privilege). With this exception the two branches of Parliament have identical rights in the exercise of the legal function; in the simultaneity of convocation, and in the closing of their sessions, which depends on the will of the king.

But there is a notable difference as regards the very existence of these two branches of Parliament which is shown in the nomination of senators and the dissolution of the Chamber.

The Italian Statute (art. 33) in the organization of the Upper Chamber requires as members those holding the most important positions in the public service and in social life. This characteristic feature gives to life membership a different stamp from that of the French Charter of 1830, from that of Prussia, in 1859, and from every other monarchical charter.

The 21 categories, in fact, constitute a true representation, with a species of gradual selective choice, because grades in membership are presupposed. The standard of nomination adopted by the Crown has followed the democratic evolution of modern society, admitting as members of the Upper Chamber even those who give expression to advanced views. On the other hand, the Senate has understood its position toward the extension of the suffrage through the composition of the Upper Chamber. With remarkable instances of initiative it has more than once even attempted to reform its own organization, introducing the elective element as a primordial basis.

This shows how the Senate has understood the spirit of the times. It has, besides, on many occasions, stretched the exercise of its power of approval to the point of disapproving the nomination of certain senators, according to a standard which seemed exaggerated to some minds. With the organic decree of 14 Nov. 1901, the minister declared explicitly his right to propose the nominees for senator; but if he thus fulfils his ministerial responsibility, it does not lessen the supreme authority of the Senate,

exercised by virtue of a constitutional function, and which contains an exclusive right to decide in regard to the merits of its members (Statute, art. 60).

Not less to be considered is the royal prerogative in regard to the choice of the Chamber of Deputies. On its right exercise depends largely wise development, or disorder in public affairs. The Statute places no limitations on him except in the request that Parliament be reconvoked within four months.

No statutory limitation exists to this high prerogative which, except in Norway, holds in all constitutional monarchies; and among the republics is recognized only in France, tempered by the previous assent of the Senate.

In the lack of regulations the experience and the wise judgment of the sovereign contributed largely in Italy to the right use of the Statute. There are certain special conditions that practice has shown may determine the necessity and the occasion for a selection:

1. When there is continued dissension in regard to high matters of state; as occurred on the occasion of the treaty between Piedmont and Austria with the celebrated Edict of Moncalieri, in 1849.

2. When a serious conflict takes place between the two branches of Parliament, and the king has not been able, or has not thought of settling it by renewing the Upper Chamber, augmenting the number of senators to assure a government majority. This is what King Humbert did in 1880, calling the assembly to decide on the flour tax, which the Chamber wished to abolish, and the Senate intended to retain (1880).

3. When the Chamber and the government had not fixed standards of general political rights it became necessary to take a popular vote to avoid more serious disturbance (1904).

4. When the new Cabinet had not obtained explicit approval, or results did not clearly show a majority of votes, on account of many absent votes (1892).

5. When through internal disturbances, notwithstanding the established majority, parliamentary business was impeded, as in 1900, when obstructionists paralyzed the work of the assembly.

6. When some grave event occurs which modifies the territory of the country, as in the occupation of Venice and Rome, which gave rise to an election in the Chamber on 13 Feb. 1867, and on 2 Nov. 1870.

7. When a new electoral law is voted. In this way the Chamber was elected in 1882 after the reforms. But it was not thought necessary to re-elect it in 1891, after the law which substituted viva voce nominations for nominations by ballot.

From this short exposition it is seen how in Italy the Crown, while preserving its high dynastic prerogatives, has from the beginning followed such a liberal policy as to render monarchy compatible with a wise democracy. The co-operation in the national reorganization, the common struggle for independence and unity, and the plebiscites have consolidated this union between the Crown and the Parliament.

The statute and political science may define the outlines, indicate the forms, but the rest must be governed by good customs which are the true guarantee of free institutions. Italy can boast of a parliamentary monarchy which will bear comparison with the correct traditions of England.

On its side the Parliament, following the trend of the times, has, without shocks or excesses, adapted its constitution to modern needs.

Thus, with harmony established between the powers of the government, and political forms adjusted, Italy may proceed serenely on the path of social reform.

Consult Crosa, Emilio, 'La competenza regia nel diritto italiano' (Milan 1916).

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10. COMMUNAL AND PROVINCIAL ADMINISTRATION. Local Government. —The local government in Italy is administered partly by bureaucratic functionaries appointed by the central government and partly by independent civic corporations under the administration of officials elected by the people. Many of the public services have in various portions of the kingdom special administrative officials. Thus, justice, the army and the navy, the administration of the mercantile marine (heads of departments and maritime regions, and commanders of the ports); the Ministry of Industry and Agriculture (inspectors of industry, of mines and forests); postal communication, telegraphs and telephones (departmental and local administration); higher and secondary instruction (universities, schools); finance (sub-treasurers). The greater number of the local services that are under government control are administered by prefects and sub-prefects. There is a prefect, a political and administrative magistrate appointed and paid by the government in every province. This magistrate is assisted in the administration of the various services by other functionaries and by various colleagues.

Above all he is assisted by counsellors of the prefecture, who individually administer some of the various branches of the service, such as the superintendence of the communes, the charitable foundations, the public works, principally on the rivers (when there are not special companies for the purpose, called partnerships), and on the government roads, the prisons, etc. The counsellors of the prefecture, three in number, constitute a council (the Council of the Prefecture), which gives advice to the Prefect on affairs of importance and audits the accounts of the communes. In the superintendence of the communes and the provinces, the Prefect is assisted by the provincial administrative "Giunta," a body presided over by the Prefect, consisting of two counsellors of the prefecture (besides a supplementary), and four other members (two supplementary) elected by the provincial council. The provincial "Giunta" is empowered to approve the most important acts of the communes and of the provinces. Five members of the "Giunta" constitute a tribunal for the consideration of various administrative questions with appeal to Division IV and V of the Council-of-State. There is a Provincial Benevolent Committee to super-

intend the charitable foundations. In the department of elementary and secondary instruction, the Prefect is assisted by a superintendent of instruction and a school provincial council. Public hygiene is under the superintendence of a provisional physician and veterinary, and a provincial sanitary council. In forestry there is a provincial council of forestry.

The police department is also under the direction of the Prefect; it has many representatives throughout the province according to the needs, police commissioners, sub-commissioners, delegates and the regular police.

There is a Sub-Prefect, a functionary paid and appointed by the government, in every region or district. The regions and districts number 284. The Sub-Prefect has the same duties as the Prefect, especially as regards the police.

The Mayor of each commune acts as a government official in matters of general concern; he is dependent in this capacity on the Prefect and Ministry. In the small communes in the same way the Mayor is head of the police.

The communes and provinces are independent public organizations under the administration of elected officials.

On 1 Jan. 1916 there were 8,343 communes. Some of these are large cities; others, little rural communes. All are civic corporations, organized uniformly according to the general law (Provincial and Communal Law of 4 May 1898, with various subsequent amendments). Latterly there has been manifested a tendency to establish special regulations, financial rules, according to the various character and needs of the communes (Laws for the Southern provinces and the Islands, 1 July 1906). The affairs of every commune are administered by a Communal Council, a "Giunta," and a Mayor. The counsellors are elected by the electors of the commune. There are four general requisites in order to be entitled to vote: Italian citizenship; and age qualification of 21 years; capacity to read and write; and that the citizen be of the male sex. The earlier restrictions were removed by the electoral law of 30 June 1912. The election of members of the Communal Council takes place every two years, when a third of the counsellors are elected. The election is on a single ticket which is voted on throughout the commune. The representations of the minority is assured by the fact that each elector is prohibited from inscribing on the ticket more than four-fifths of the names of the candidates for election. The vote is a secret one. All the electors are eligible for the position of Communal Counsellor except in some cases of incompatibility. The Communal Council meets twice a year in ordinary session; and in extraordinary session whenever it is necessary to do so. The power of deliberating on the interests of the commune belongs exclusively to the Communal Council. It decides on the regulation of local police, of hygiene, building permits, determines within the limits of the law the communal taxes, goes over the expense bills, approves the annual budget, nominates and licenses employees, and administers the wealth of the commune. The communal "Giunta" is composed of a number of members, varying from 10 to 2 (besides two to four supplementaries) according to the population of the commune. The members of the "Giunta" are elected by the Council, and chosen from among the Counsellors. They are all elected anew every four years. The "Giunta" prepares the matters of deliberation for the Council and itself deliberates on matters of secondary importance. It may, in case of urgency, deliberate on matters belonging to the Council; but these deliberations must be submitted to the Council for ratification at its first meeting. The Mayor may be recalled by the Council, suspended from office by the Prefect and removed by royal decree. The Mayor presides over and convokes the "Giunta" and the Council, and carries their deliberations into execution, makes stipulations for contracts, represents the commune in law, supervises the communal force of employees. In case of urgency, he may issue regulations in regard to public safety in matters of hygiene or building permits, which can be put into force at once.

In every commune there must be at least one paid administrative official, the secretary of the commune. The action of the communal authorities is submitted to the control of the government authorities. All the deliberations of the Communal Council and "Giunta" are submitted to the Prefect or Sub-Prefect. The Prefect may annul them if they are contrary to the laws. The more important deliberations, such as regulations, deliberations in regard to taxes, mortgages, contracts binding the commune for over five years, the acquisition of real estate, and, in many cases the budget, etc., must be approved by the administrative provincial "Giunta," which has the power to approve and make them legal. Some other special matters concerning education and public health must be approved by the Provincial School Council, or the Council on Sanitation. If the communal authorities neglect to take action, or to make provision for obligatory services, the Provincial "Giunta" (and in some cases the Prefect) may take action in the matter. In grave matters of public order, or in serious disturbances in the administration, the Communal Council may be dissolved by the Central Government. The communal affairs in that case are administered by a commissioner extraordinary appointed by the government. He cannot remain in office longer than six months. At the end of this time a new council is elected. The communal services are obligatory, or optional. They are obligatory when they are established by the law; the rest are optional. The communes in which the taxes on land and buildings exceed the legal rate, of which we shall speak later, cannot have optional services. The principal obligatory services are as follows: The most important is elementary education; every commune must have at least one elementary school with one teacher, and it is bound to have schools and teachers in greater number in proportion to the population, so that all may receive education (Law of 13 Nov. 1859; 15 July 1877; 21 Oct. 1903; 8 July 1904). (See ITALY — SCHOOLS AND UNIVERSITIES). Another important service is that of public health. Every commune must have a physician and a midwife paid by it for the gratuitous care of the poor. It must, if possible, pay another physician appointed by the government (or sanitary inspector) to supervise hygienic conditions. A commune may be obliged to employ a veterinary surgeon.

Every commune must be furnished with drinking water, and have a cemetery (Law of 22 Dec. 1888; 26 June 1902; 25 Feb. 1904).

The service of local police comprises lighting, prevention of fires, superintendence of street traffic, etc. The service of roads and highways includes the communal streets, their construction and maintenance. The service of beneficence comprises, in the communes, the obligation to bear the expense of the sick poor taken to the hospitals; to aid, with the provinces, in the expense of caring for foundlings; and with other societies in providing for those who are unable to work. Besides this, the hospitals and other charitable foundations take a share in public beneficence (Law of 17 July 1890; 30 June 1889). The communes must also provide for the needs of private individuals by the municipal services, such as the manufacture of gas, of electricity, the distribution of drinking water to the houses, tramways, etc. The municipal plants of these industries must be approved by referendum (Law of 29 March 1903).

The revenues of the communes come in great part from the rents of real estate, from capital and industry. The rest is obtained from taxes. The principal are the following:

On funded property (land and buildings) the several communes may lay a tax as high as 50 per cent of that owing to the state (Government tax). In exceptional instances this limit may be surpassed. There is the indirect tax on consumption (excise tax); on foodstuffs (except bread and flour); and other articles of necessity and luxury (Law of 15 April 1897; 14 July 1898; 23 Jan. 1902). An income tax may be established on the revenue of each family, which is slightly progressive. The personal revenues which are partially liable to this tax are assessed only in the way of two other taxes — on professional income and on cattle. There are a few other local taxes of minor importance. The communes have the selection between these taxes, but they must observe a certain order and a certain proportion between them; they cannot impose any other taxes. The communes may unite associations to deal with their expenses and to provide for some branches of the services (schools, streets, physicians, industrial plants, etc.).

Every province has a provincial council, a provincial deputation and a president of the same. The provincial council is composed of a number of members varying from 60 to 20, according to the population. The counsellors are elected by the voters of the province. The voters of the separate communes are the electors of the province. All these voters who have their domicile in the province, or pay their taxes here, are eligible as provincial counsellors. The election is by separate colleges or districts. Each college nominates from one to five counsellors, according to population.

The provincial deputation consists of a number of members — from 10 to 6, according to the population of the province. These are elected by the council, are chosen from among the counsellors, and hold office four years. The deputation is charged with the preparatory work, the same as the communal "Giunta." The president of the deputation is elected by the council from among the counsellors. The provincial council may also be dissolved by the government in certain emergencies; the provincial affairs are then administered for not more than six months by a commissioner extraordinary.

The principal obligatory services which belong to the provinces are the roads and other important public works throughout the province; the expenses of beneficence in the maintenance of lunatics and the erection of lunatic asylums (Law of 14 Feb. 1904); the contributing toward the expenses of the care of foundlings; certain services and expenses connected with Sanitation (Law of 22 Dec. 1888; 21 July 1902). The province also provides for other services connected with secondary education and agriculture. Consult Nolla, P. D., 'L'amministrazione dei communi delle provincie' (Verona 1891).

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11. DEPARTMENT OF JUSTICE. Justice, in civil and penal matters, is administered in Italy by justices of peace, county judges (*prætors*), tribunals, appellate courts, assizes and the supreme courts.

Special laws regulate the jurisdiction of military and naval crimes. A college of officials of the public ministry is established at every tribunal and every court. Before the county judges (*prætors*) the functions of the public ministry are administered by *vice-prætors* and minor officials, or by ordinary citizens who are occasionally appointed by special delegation.

To each of the above-mentioned tribunals there may be supplied additional magistrates and auditors. The number of magistrates and judges of the different categories, and the boundaries of the territory wherein they exercise jurisdiction, is fixed by law, and cannot be changed by executive power. This principle is important in relation to the fundamental constitution of the kingdom, that every man must be tried in the district where he is a resident.

The magistrates (except the judges of the peace) are all nominated by the king, at the proposal of the Minister of Justice, from among those who have the requirements prescribed by law. No one can become a magistrate who has not served his novitiate as an "auditor," except the advocates and the solicitors, who may be received after a certain number of years of professional practice in the magistracy, or as judges or as officials of the public ministry.

Auditors are admitted after oral or written examination, provided they have been admitted to the bar. After 18 months' practise they may pass by examination to the rank of additional judges. This is the source of supply from which future county judges (*prætors*) or judges are selected. Every other profession or office is forbidden to the magistrate, except that of county or common counsel and of deputy in Parliament, but with some restrictions concerning the place of the election and the number of judges who may be deputies. There is a strong expression of public opinion which seeks to make this office incompatible with every other. The trials are public unless the judge

considers that for moral reasons a case should be tried behind closed doors.

Justices of Peace.— In every community there is a justice of the peace, nominated by the first president of the court of appeals of his district, who must be selected from a list of eligibles submitted to him by the municipal authorities. This list is formed each year. The justice of the peace has two functions; one that of mediator and peacemaker in controversies of every kind. He is obliged (if requested by one of the quarreling parties) to attempt to bring matters to an agreement by summoning the other party, who, however, is not obliged to appear. Further, he has the function of judge in cases not concerning property rights, as real estate, not exceeding 100 francs in value, and in cases concerning evictions from the houses or farms, not exceeding 300 francs rental (about $60).

All suits of not more than $10 value are settled by the justice of the peace and cannot be appealed. The competency of the justice of the peace is regulated in this manner by the new laws of 16 June 1892, No. 261; 28 July 1895, No. 455, and 24 Dec. 1896, No. 547, because the code of the civil law effective on 1 Jan. 1866 (at the time of the legislative and administrative unification of the new kingdom of Italy after the wars of 1859 and 1860), circumscribed the competency to $6. The enlargement of power did not have good results, so there is possible a return to the former restriction that the justice of the peace may be peacemaker for all kinds of controversies but can only act as judge in cases of small money value.

County Judges.— In every district there is a county judge (*prætor*) to whom, according to the pressure and importance of his work, can be assigned one or more assistants, selected from recent graduates of a law school or from the assistant judges. The assistant judge can be nominated county judge after two years' practise as assistant. The county judges pass sentence, in civil and commercial matters, in lawsuits of a greater value than those over which the justice of the peace presides, but which may not exceed $300, except suits of honorary civil or political rights wherein the state is interested. Further, they pass sentence in lawsuits of any value concerning personal possession.

In penal matters the county judge may pass sentence upon all crimes not libellous; for these the sentence cannot exceed three months of prison, one year of exile, or $200 fine.

Lawsuits of executive proceedings are also tried before the county judge, provided they concern household goods. Further, the county judge may preside over family councils and decide questions of guardianship for children and feeble-minded people. It is not necessary that the defense before the county judge should be conducted by an advocate or solicitor, but, in civil or commercial cases, it is sufficient to have a citizen who is considered capable on the authority of the judge.

Tribunals.— The members of the judicial authority, named tribunal, are called judges and county judges (*prætors*), and assistant judges can be nominated judges after several years of service. In each district there is a tribunal. The tribunal comprises, in civil and penal cases, three members, and in the largest towns, where the number of trials is great, it is divided into sections. The chief of the tribunal is called president. In the first instance the tribunals try all cases, civil, commercial and criminal, exceeding the competency of the county judge. This limit has already been indicated. They also try heavier criminal and libel cases. The tribunes appeal cases sentenced by the county judge in the first instance as well as civil, commercial and penal matters.

In civil cases tried before tribunals each suitor is obliged to have the assistance of a solicitor. Even if the plaintiff and defendant wish to appear and represent their causes personally they are always assisted by a solicitor who can interfere if, according to the president's opinion, the quarrelling parties are either too inexperienced or too angry to continue.

In criminal cases the accused must be defended by a lawyer. At every tribunal there must be an attorney of the people, who is called solicitor for the king. In criminal cases this public minister represents human society which punishes the crime, and if he thinks the suspected man is guilty, he makes the accusation and requests from the judge his condemnation. If, on the contrary, he believes in the innocence of the accused or has knowledge of some extenuating circumstances he can demand of the public ministry his release. The presidents of tribunals and the prosecutors for the king are magistrates of equal degree.

Appellate Courts.— Every appellate court consists of at least two sections, one for the penal cases, and one for civil cases. Where, on account of a larger population, the number of cases is greater, there are more sections. The members of the appellate court are called counsellors and are of the same rank as the president of the tribunal. At the head of each of the sections composing the court, there is a president. The latter is equal in rank to the counsellors of the court of cassation, while the first president of the appellate court is a degree higher than the counsellor of the court of cassation. Before the appellate court are brought, on appeal, all penal and civil cases judged by the tribunals in the first instance. In civil cases the court comprises five members; in penal cases, four members. Every appellate court has an "office" of the public ministry represented by a general solicitor of the king and by one or more substitutes, according to necessity. Matters of ordinary jurisdiction can be appealed before the appellate court, and here is heard, also, the opinion of the public minister, and it is decided upon by the members in council.

Assizes.— These courts are exclusively for penal cases, and are distinguished from all others because there are co-operating judges, called "jurors," who are selected by lot from a list of citizens, which is revised every year. For each session 30 jurors are selected, from these are chosen 14 for each case. Out of these 14, 12 are acting jurors and two surrogate jurors, in case one of the acting jurors should be absent during the trial.

There are one or more courts of assizes for every appellate court district. They sit generally twice every year, in spring and in autumn. But, if necessary, there are extra sessions. The court of assizes is presided over by a magis-

trate who is counsellor of the appellate court or president of the tribunal. The court of assizes is competent to judge all political crimes and all of the other more serious crimes which receive the penalty of more than 10 years in the penitentiary. The jurors pronounce the sentences based upon the facts which constitute the accusation, without manifesting reasons, but merely by a yes or no given after a secret consultation. The jurors being 12 in number, the majority decides, but in cases of equal votes, the verdict which is favorable to the accused is the one taken.

After the verdict of the jurors, if affirmative, the court may be of the opinion that the facts do not constitute a crime, according to the code. This almost never occurs. Ordinarily when the verdict is affirmative (that is, with at least seven votes) the court pronounces and determines the penalty. Against a sentence of the court of assizes no appeal is possible, only a recourse to the court of cassation for violation of the law.

Supreme Court — Court of Cassation.— There are five courts of cassation in Italy. This multiplicity is in contradiction to the function of magistracy of pure justice which characterizes one court of cassation. But Italy, formed so recently by the uniting of several states, was unable to eliminate completely from every state all their central organs. She was obliged to leave the courts of cassation, as well as several other things, at Turin, at Florence, Naples and Palermo, and was obliged to form a court of cassation at Rome when this became the capital of Italy. However, though there are apparently five courts of cassation, in substance there is only one, divided, however, into sections which instead of being all united at the capital, are distributed among several cities of the kingdom. The penal jurisdiction has been completely barred at all the other courts and entirely concentrated at Rome. To the Roman court has been exclusively consigned all cases concerning taxes and ecclesiastical matters. The court of cassation in handling civil matters is composed of seven members. It examines the sentences from which an appeal has been taken, and if no error of justice appears the appeal is rejected and the case finished. But if some error of justice (in form or substance) appears, the sentence is annulled and, without judgment, is dismissed to another magistrate. This last magistrate is free to judge according to his personal opinion, but his sentence is also subject to an appeal to the court of cassation in many cases. The court of cassation in Rome is also invested with the power of regulating questions of jurisdiction between the administrative authorities. Therefore when a sentence of appeal is denounced on account of having been unjustly judged on the question of competency there is no other recourse than to the court of cassation in Rome. Thus the court of cassation in Rome has the function of a Supreme Court, and as the kingdom of Italy is governed by the parliamentary system and there is no plurality of states, there can be no question as to whether a law is or is not constitutional (as happens in the United States and in the confederation of Switzerland); the law being an emanation of the power of the throne which judicial authority can never dispute but must always respect. Judgment on the constitution can only be passed in Italy on the decrees and acts of the government as an executive power, inasmuch as we may decide whether the law of the state has been broken, because the executive power can exercise free action over the facts which are not regulated by law. But in cases of facts which do some under the law, the executive power has to conform to them. However, the decision, provided the act of the executive power be constitutional, belongs entirely to the judicial authorities.

Military Justice.— For crimes committed by soldiers and officers of the army there are military courts which judge without possibility of appeal, but from whose decision recourse can be made to the supreme tribunal of war and navy which functions in the same way as the penal court of cassation. Analagously, there are maritime tribunals for sailors and officers of marines, with recourse to a similar supreme court.

Jurisdiction of the Court of Accounts.— The Court of Accounts is instituted to examine and decide all controversies which concern the accountings of the administration of the state, of the provinces and communities; and further has to decide in all controversies regarding the pensions of employees of the state.

Jurisdiction of the Council of the State.— The council of the state is a consulting corporation divided into three sections for the various matters which must be interpellated, and passes its opinion on the affairs of the nation; further, there has been added a fourth section which is charged with the jurisdiction of all affairs in which a private person or a corporation claims to have had his interests interfered with by an unjust administrative act of some local or central authority. The recourse to the fourth section is made in the same way as the recourse to the court of cassation, and a discussion between the lawyers of both parties is public.

Other Special Jurisdictions.— In every province there is an administrative corporation, to which recourse can be had in certain categories of affairs, and the decisions of which can be denounced for violation of administrative law by the fourth section of the council of state. There are special commissions for the imposts as well as for the custom houses. The power of these commissions is merely to decide the valuation of the imposts and the duties which must be paid. In the case of a question of a violation of the law through an attempt to collect customs dues unjustly, the power belongs to the judiciary authorities.

Bibliography.— Consult Orlando, V. E., 'Primo brattato di diritto amministrativo italiano' (Milan 1900–12); Romano, Santi, 'Principii di diritto amministrato italiano' (Milan 1906).

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12. THE PAPACY AND THE GOVERNMENT. Italy has been called upon to solve the gravest and most important problem that has agitated modern Europe — that of the

abolition of the temporal power of the Pope. We cannot here dwell on the history of the rise of this power. Its *raison d'être* at the present day, from the ecclesiastical point of view, is that, with the Catholic Church organized into a monarchy, with the Pope as sovereign, in Rome, the Catholic world, he would have sought to secure the independence of the Great European States, and would have acted as pacificator and umpire in settlement of their differences. Those states on their part recognizing the value of the influence of the papacy for their own purposes, would consequently take care that this great power should not fall into bondage to any one of them, but should remain independent and autonomous.

Hence it followed that the popes sought to form a temporal power of their own, in which they should rank as independent sovereigns, and since they were unable to form one strong and powerful state, they sought to keep Italy divided up into several petty states, thus preventing the formation of one preponderating power in the peninsula. For this reason every attempt toward the unification of Italy, or toward bringing it under one dominating power has always been opposed by the papacy.

Europe also opposed the unification of Italy for different reasons; but the desire to protect the temporal power of the Pope by preventing the unification of Italy was also a factor in European politics.

After the overthrow of the French domination in the 19th century, the Italian national sentiment gradually developed, and as the desire for the independence of Italy grew, the problem of the temporal power of the papacy was made a matter of serious consideration by the writers and political men of the day. But if in order to establish this federal idea and realize this beautiful ideal of Italian unity, she should despoil the Pope of his temporal power, Italy felt that she would incur the ill-feeling of Europe. Hence, unification seemed impossible. Hence, the neo-Guelphism of V. Gioberti, who originated the idea of making the Pope the head, the President, of the Italian federation. But during the revolution of 1848–49, when the idea of the independence of the Piedmontese monarchy originated, it seemed necessary for the unification of Italy to abolish the temporal power of the Pope.

After the revolution of 1859 Gioberti's idea as proclaimed in his great work, 'Il Rinnovamento,' that Rome should be the capital of Italy, and that there should be a reform in Catholicism through which it would no longer be necessary that the Pope should hold temporal power, seemed fulfilled in *Italia Unita;* and Cavour, the great statesman, proclaimed in the first Italian Parliament, held in Turin, that Rome was henceforth the capital, and declared that in Rome, Italy should proclaim the liberty of the Church, that is to say, granting to the Pope, by mutual agreement, independence in the exercise of his spiritual sovereignty over the Catholic world, and liberty to regulate the affairs of the Italian church, thus abolishing the existing concordats and laws which were in force in several of the Italian states, after the manner of the other Catholic European states.

When Cavour died, the Roman law courts objected to all agreements entered into by Cavour, and the Catholic world endeavored to prevent Italy from taking possession of Rome; and as the pontifical states in 1860 were no longer able to govern themselves, the French occupation, begun in 1849, was continued, although the Emperor Napoleon III in 1864 pledged himself to withdraw the French troops; but he did not do so until 1866, only to send them back again in 1867, when Garibaldi attempted to take forcible possession of Rome. Italian statesmen in the years 1861 to 1870 endeavored to persuade Europe that should Italy take possession of Rome she would give ample guarantees of independence to the Pope and liberty to the Church, and thus they prepared the way for an occupation to be undertaken as soon as a favorable opportunity presented itself. And this occurred in 1870, when France, engaged in a war with Germany, was obliged to withdraw her troops, and soon, in addition to her other disasters, came the fall of Napoleon, who had formed with Italy the agreement of 1864.

On the 20th of September Italy took possession of Rome and declared herself absolute temporal ruler, with the acquiescence, more or less cordial, of all the European governments. The latter, confiding in the promises of the Italian government, no longer interested themselves in the question of temporal power and the "Roman Question," that is, the attitude of the Pope and of Italy in regard to the possession of Rome, was considered a purely Italian question, in which it was not permitted to foreigners to meddle. The Law of Guaranty was passed by Parliament 19 May 1870, assuring independence to the Pope and liberty to the Church. At the time this law was criticized bitterly, even by those who, afterward becoming ministers, scrupulously observed it themselves, and made others observe it; for they were convinced that through this law Italy would succeed in making the abolition of the Pope's temporal power an accepted fact.

The law has two clauses: the first, concerning the prerogative of the Pontiff and of the Holy See. The person of the Pope is declared sacred and inviolable; all public and personal attacks on his reason, evil speaking and other offences directed against him to be punished as though they were directed against the king. But as this special protection guaranteed to the Pontiff did not diminish or prevent the liberty of conscience and of the press, it was explicitly stated that the discussion of religious matters was freely permitted. By this arrangement the law recognized in the Pope a sort of spiritual sovereignty, independent of the temporal power — with which he was invested primarily — and also gave back to him sovereign honors and recognized his precedence, as is done by other Catholic sovereigns.

Once his sovereignty was recognized, the Pope could maintain a guard of honor, divided into classes, Swiss, Palatine and Noble, none of whom, however, have any recognized military rank in the national government; in fact the men who compose them, even though Italian citizens, are not subject to military duty as are ordinary troops. The number of these guards was not determined; the law reading "the usual number" was meant only to prevent the enrolling of so large a number as to be a menace

to public order. The spiritual sovereignty of the Pope gave him the liberty to perform all the acts of his spiritual ministry, communicating freely with the Catholic world, planning as he saw fit the administrative policy of the Holy See, which was again called "Curia Romana." It was therefore ordained that no political, administrative, or judicial authority should, without permission from the Pope, enter the palaces or places of his residence. It was forbidden to visit, to make a police search, or sequestration in the papal official "congregazione," which corresponds to the cabinet of a secular government. The Pope may affix to the doors, the gates of the Basilica, and churches of Rome (a historical manner of publishing the Pope's mandates) the acts of his administration. The foreign ecclesiastics who hold positions in the "Curia Romana" enjoy the same personal privileges as citizens. They cannot be expelled, nor be prosecuted by law, or otherwise molested. The Pope corresponds freely and independently with the Catholics in Italy and abroad; he may install in the Vatican, or in the place of his residence, post-office officials, telegraph and telephone operators, these employees to be chosen by himself.

The papal post-office correspondence is transported in a closed bag to the postal officials placed on the frontier, and papal mail matter is remitted by the Italian officials gratuitously. The same rule is observed for telegrams; the papal wire is connected with the rest of the state, and the papal telegrams are in the same category as the telegrams of the Italian government and are transmitted gratuitously as if the postal or telegraphic correspondence were addressed to the king.

It is a secular custom that the institutions for ecclesiastical instruction and education in which the Holy See has the greatest number of dignitaries and functionaries, should be situated in Rome, and its six adjoining bishoprics, which are immediately subordinate to the Pope as Bishop of Rome. Now, because in this the Pope is entirely free, these institutions are withdrawn from all interference from the school authorities of the state, for the Pope can nominate whom he will to the higher ecclesiastical positions, and the bishops can do the same for the smaller ones, without the authority of the government, giving the *exequatur* to the orders in the first instance, and the *placet* in the second, for the enjoyment of the beneficies annexed to these positions as well as for others in the kingdom.

With the purpose of removing any pretext for outside interference, and moved by the necessity of providing for the economic exigencies of the Holy See, the law has ordained a species of civil list for the Pope of 3,225,000 lire (about $645,000) a year, entered in the great volume of Public Debt as a perpetual and inalienable payment free from every kind of tax. The sum was fixed according to the balance of the Roman States of 1848, the only one published. This fund must be used for the support of the Pope, for the various functions of the "Curia Romana," for the maintenance in ordinary and extraordinary of the palaces of the Vatican—for the stipends of those employees attached to the court, to the museums, to the picture galleries, to the libraries, etc. The Pope has never demanded payment of this money, but the agreement to pay on the part of the Italian government has never been withdrawn, hence the total credit remains intact, though every five years the interest is outlawed, according to Italian state custom.

The apostolic palaces (Vatican and Lateran) the Villa of Castel Gandolfo and their dependencies according to Italian public law should have been declared part of the government domain; instead of that, this declaration, on account of political exigencies, was omitted, and by Art. 5 of the law the enjoyment of them was given to the Holy See in perpetuity, but at the same time the archæological collections and the libraries adjoining are declared inalienable, which means that the Pope and the Holy See have no proprietary rights to them (as the clerics pretend) which would comprise the right to alienate, by sale, exchange or donation.

The Pope has besides, as an adjunct to his sovereignty, the right to an active and passive embassy, that is, the Italian government recognizes in all his functions the Ambassador of the Holy See (just as the King of Italy recognizes any other ambassador), and similar privileges throughout the kingdom.

As the papacy is an elective monarchy, and during an interregnum the sovereign power is vested in the College of Cardinals, which elects the Pope in conclave, the Italian government is obliged to protect the conclave from all molestation and is hindered from placing any obstacle to the personal liberty of the cardinals. Hence the ecumenical councils throughout history are regarded as sovereign assemblies of the Church and receive the same consideration as do their individual members. But now, since the proclamation of the dogma of infallibility, it is very difficult for them to continue as councils, as the Pope may *ex cathedra* define and proclaim the religious truths obligatory upon the faithful (dogma).

Such is the law which, since 1871, has governed the relations between the Pope and the government. It was never fully accepted in the Holy See, but nevertheless the latter enjoys all the privileges of a practical nature, which the government always observed and caused to be observed. Undoubtedly there never before was a time when the spiritual sovereignty of the Pope could be declared as openly as at present, as was proved by the two conclaves held since 1870. In spite of all this, and with all the conditions essential to this freedom, and the enjoyment of the privileges and protection of the law, the papacy has never recognized the state régime of affairs established in Rome in 1870. When the Pope and the king came to an explicit understanding it was natural to believe, in the Catholic world, that either the Pope would subordinate his spiritual acts to the interests and political advantage of Italy, or that the Italian government would subordinate its policy to the exigencies of the Pope and the Church. Official animosity, by reason of the Law of Guaranty, enabled the Pope to enjoy that independence which, for centuries, could not be maintained unless by retaining the temporal power; moreover it permits the Italian government to maintain, in fact as well as in theory, a perfectly independent position in regard to a power as morally great as the papacy.

Thus, the official enmity serves both parties: it suits both that the Pope should consider the government as a usurper.

This official enmity was associated with a personal enmity, which has never prevented secret agreements with the papal authorities responsible for the safety of the Vatican and the Pope, and the political authority of the kingdom, during the pontificate of Pius IX, and at longer intervals during that of Leo XIII, who sought to isolate Italy politically, and thus to weaken, if not destroy the monarchical institution; under Pius X this enmity was only official. That Pope was never a cardinal of the Curia, but during the time he was priest, pastor and bishop he had always held a simple cure of souls, at a distance from Rome, and he saw in his youth foreigners ruling over his native country (Venice), and he exulted when he saw the Italian tricolor flag substituted for the yellow and black standard. As a patriarch of Venice he frequently had dealings with the sovereigns of Italy (for Venice was acquired through an international treaty and legitimately conquered by the House of Savoy) and he assisted in putting a stop to the socialist propaganda, which at the same time attacked monarchial institutions and religion, and he opposed it at Venice, inducing the faithful in the Church to vote in accord with the liberal monarchists. When he became Pope he could not forswear his former attitude; hence, while abstaining from every action which gave assent or approval to the established conditions of 20 Sept. 1870, when the king's soldiers entered Rome, he did not continue the unyielding anti-Italian policy of Leo XIII and evidences were soon perceived of this new line of conduct of the Holy See. Pius X was a religious Pope, and as religion and the Church were not being persecuted, he permitted frequent infractions of the law *non expedit*; that is to say: the formal prohibition of Catholics from taking part in political elections, which was promulgated by Pius IX and confirmed by Leo XIII. But just because he would not recognize Rome, even tacitly, as the capital of the kingdom, he always opposed the formation of any Catholic party in Parliament. The Catholics should vote for a monarchical candidate in preference to a Republican or a Socialist. Catholics loyal to the Holy See may enter Parliament and swear fealty to the king and the constitution, but none has the right to call himself a representative of the ideas and principles approved by the Pope. And this was stipulated, because otherwise it would appear as if the Pope acknowledged the right to the possession of Rome, and the electors and parliamentary deputies faithful to the Pope, and the interpreters of his views, would be unable to deny the fundamental principle of this acknowledgment, namely, the unity of Italy with Rome as its capital. Hence it is not possible in Italy to form a party similar to the Catholic Centre in the German Reichstag.

Thus it happens that now between the Pope and the king, that is, the Italian government, there is an official enmity, a lack of friendly feeling of agreement, and there exists only a practical *modus vivendi*, founded on the Law of Guaranty which obviates all cause of controversy.

And this is the condition of affairs which best suits both parties: the Pope, because the prosecution of open hostilities would not be agreeable to the sentiment of the great majority of the clergy and of militant Catholics; whilst the open recognition of Rome as the capital would clash with prejudices not yet removed and would diminish the reputation of the independence of the Holy See in the Catholic world. It suits the king's government because it removes the necessity of regarding the Pope, his faithful clergy, and the more zealous of the flock, as enemies, and allows him to enjoy the indirect aid of the first and the direct assistance of the others in combating the subversive parties without assuming any obligation to make legislative concessions which might change the secular character of the Italian government, and also without incurring any kind of responsibility toward foreign governments through the international policy of the Holy See.

But the necessary condition for the consolidation of this state of things is the maintenance of the "Law of Guaranty." By this means the Holy See and the Church will avoid in Rome serious trouble and Italy will not see the birth of civil dissensions which would be a menace to her prosperity. Everyone in Italy is agreed on this point, and no statesman, no matter how anti-clerical, would think of changing it. Although it does not form a part of the national constitution, it is nevertheless looked upon as a law of constitutional importance, and as such cannot be changed without radically changing the order of fundamentally Italian institutions. It has not, in truth, the character and importance of an international law, i.e., a law which implies a strict contract with other governments, but for all that the Italians are convinced that it cannot be disregarded without interfering with the position that Italy occupies in the international society and producing a serious and perhaps ruinous change in her position in the political world.

Therefore everyone in Italy is agreed on the maintenance of this law, although they recognize its defects. This is a compromise truly worthy of the character and political traditions of the Italians. And hence, this law expresses the nature, the character of the people, which is averse to exaggeration and to all kinds of excess; it agrees with its tendency to compromise and to surmount difficulties by strategy rather than force. Besides all this it is a historical necessity which Italy could not disregard after having abolished the temporal power of the Pope. Not in vain were Niccolò Machiavelli and Francesco Guicciardini, those founders of the art and science of diplomacy, born in Italy.

Consult Quinet, Edgar, 'La question romaine devant l'histoire' (Paris 1868).

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13. POLITICAL PARTIES. In order to understand the origin of the political parties which asserted themselves in the first Italian Parliament we must remember that the unity of Italy was obtained by the combined forces of the constitutional monarchy of Savoy, which governed the ancient kingdom of Sardinia, and the ancient revolutionary Republican party which from 1832 had had as it master and in-

spirer Mazzini, and as a leader, during the events of 1859–60, Garibaldi.

In 1861, the Kingdom of Italy being established but not fully organized, the Right, which was more numerous and was composed of all those who, having followed the impulse given by Count Cavour, admitted unconditionally the monarchical constitutional form of government, because they saw that monarchy was indispensable not only to complete it, but also in order to the continuance of the unity of Italy. On the contrary the old Mazzini conspirators and the most active and enthusiastic followers of Garibaldi sat generally on the Left.

But very shortly a large fraction of these, accepting the formula of Crispi which affirmed at that time that a monarchy would unite Italy and a republic would disintegrate it, gave in their allegiance more or less conditionally to the monarchy, and constituted the Constitutional Left, which thus little by little became distinct from the Extreme Left, to which belonged all those who remained more firmly attached to the traditions and to the doctrines of Republicanism.

Until 1870 the question which chiefly divided the Constitutional Left from the Right was that relating to the method to be followed in completing the unity of Italy. The members of the Left, in accordance with their principles, had the greatest confidence in conspiracy and popular movements, while those of the Right, who had always been lovers of law and order, or had connected themselves entirely with those principles, placed their confidence above all in the action of government, of diplomacy, and of the regular army. But the difference in the platform of the two parties was not so great as that of their origin and political education which caused them each to remain well disciplined and compact, so that the Right always remained in favor of the government, and the Left always opposed to it. Both one and the other, however, had a pronounced anti-clerical tendency; for at that time the temporal power of the popes was an obstacle in the way of the perfecting of Italian unity, and the Pope had prohibited all those in whom the religious sentiment predominated over patriotic feelings from having a seat in the Chamber of Deputies and participating in political elections.

The unity of Italy being an accomplished fact with the taking of Rome in 1870, the ranks of the Left were gradually increased by all the malcontents that the new régime had created because of the superfluous concentration of bureaucracy, and on account of the heavy burden of taxation; so that in 1876 they were able to obtain a majority in the Chamber of Deputies and get control of the government. But the superfluous outside elements which had crept into the party; the inherent lack of discipline of the ancient revolutionary elements which yet lingered in their composition; and, above all, the lack of a definite program, which, after 1860, should distinguish the Left from the Right, caused disorganization and disorder to enter the ranks of both the old parties. In consequence of this Depretis, who, with a few interruptions, was Prime Minister from 1876 to 1887, governed with the support of a majority composed of elements of the Left and of the Right. A small group of "intransigeants" from the Right did not join the majority, also a few groups of the Constitutional Left who adhered to the other parliamentary leaders, among whom was Crispi; and, lastly, the Extreme Left, at that time very numerous and very tenaciously attached to the revolutionary and Mazzini traditions. The situation was not notably modified when, in 1887, Crispi came into power; nor under the successive ministries presided over by Rudini, Giolitti, Zanardelli and other parliamentary leaders. From that day to this, the only new events of importance which occurred in the composition of the representative parties in the Italian Chamber of Deputies, were the disappearance of the little group of "intransigeants" of the Right wing on the one hand, and the entrance and establishment of the Socialist party, and of another of more recent date, composed of a small number of deputies, calling itself the Catholic or Clerical party.

It has already been mentioned that, until the end of the pontificate of Leo XIII the Clericals, as those are called in Italy in whom the religious sentiment prevails, and who obey the injunctions of the ecclesiastical authority, took no part in the political elections. But now the constitutional candidates are frequently supported by Clericals in opposition to the Socialist candidates, and sometimes even to the Republicans. It, therefore, not infrequently happens that when two candidates are in the field — one constitutional and the other clerical — they vote for whichever candidate shows himself best disposed and less hostile toward the interests of the Church. In five or six districts the success of those candidates was assured who openly declared themselves the defenders of those interests. Although united in this one platform they yet act independently and all vote as they please on all questions that do not pertain to principles of religion, and hence do not form the nucleus of a true political party.

At present more than four-fifths of the Italian deputies (about 420), openly adhere to the present monarchical institution under the House of Savoy. They are divided into the Right, the Constitutional Centre and the Constitutional Left; but these names have at the present time a signification which is largely topographical, i.e., having a relation to the position that each deputy occupies in the Chamber, or, at most, they serve to distinguish the adherents of the different parliamentary leaders. Thus, the followers of Rudini prefer to remain on the Right, those of Sonnino are all found in the Centre, while on the Left are seated the most faithful constituents of Giolitti and all of those who were previously attached to the fortunes of Zanardelli.

With many exceptions, in the Constitutional Left may be found the greatest sympathy for a popular program, and above all, among the deputies who are the Extreme Left. There undoubtedly belong to the Constitutional Left many deputies who have positive anti-clerical sympathies, and many others who show no marked political preference and are always ready to vote in favor of any government.

The deputies of the Extreme Left, who number about 90 and are subdivided into Radicals, Republicans and Socialists, have more pronounced political sympathies. The first group (Radicals) is the most numerous; the second (Republicans) the smallest. Nevertheless,

among the Radicals are some old Republicans, who with the lapse of time have come to admit that even a constitutional government may become a legitimate government, that temporarily, at least, it may be of benefit to the country. The more stalwart Republicans, on the other hand, remain strictly faithful to the old platform of Mazzini, but with some of them this fidelity is rather the result of attachment to their own political past than of a lasting conviction and choice. The Socialists, finally, are subdivided into reformers and revolutionaries; but these two factions are determined rather by personal rivalry between the leaders of the party than by substantial differences in their platform. Although both adhere to the humanist doctrine, for the time being they confine themselves to supporting laws and provisions that favor governmental or municipal ownership of public institutions, and strengthen the hand of the labor unions.

The parliamentary system in Italy being as it is, the Ministry should naturally control the majority of the Chamber. This majority is ordinarily composed of deputies from the Right, the Constitutional Centre and the Constitutional Left, with this distinction — that sometimes the one wing predominates, sometimes the other. It is not infrequent that the Radicals, and even the Republicans and the Socialists, vote for a time for a certain Minister on the promise of a certain law or provision in which they are interested. There is always, however, in the Chamber, a more or less numerous party of the opposition formed by two groups of constitutional deputies whose leaders do not form a part of the Ministry, and these are joined by some independent deputies and those who, for personal reasons, are dissatisfied with the government. In the long run the opposition can also always count on the support of the Extreme Left, or at least of the greater portion of it.

This almost anarchical condition of Italian political parties may well astonish those who are accustomed to the more severe discipline of parties in the United States of America, in England, and even in Belgium. But we must take into consideration that in Italy political parties exist rather in the Chamber of Deputies than in the whole country. In fact, outside of the Chamber, only the Socialists and the Clericals have truly organized parties. The truth is that the great majority of Italian candidates count primarily on personal friendship, loyalty and influence for their success rather than on the support of a political party; and although there are a certain number of persons, particularly in large cities, who vote according to their political convictions, there are more who cast their vote purely and simply for the man they know and respect, or from whom they hope to gain some advantage.

The consequence of this is that one finds some districts in which there are no Republican electors, electing a Republican deputy, and a district, which yesterday elected a man of the Right Wing, the next day — without any change having taken place in the political opinions of the electors — electing a man of the Left Wing, and even a Radical. Primarily, therefore, in the majority of cases it is the deputy who gives the political trend to the district, not the district that influences the deputy. The deputies, therefore, entering the Chamber not through the means of a party, but almost free from all party obligations, usually place themselves at the disposal of the parliamentary leader who inspires them with the most confidence, or the greatest sympathy. And if the new deputy should hold himself aloof and independent he seldom does it from noble and worthy motives, but more frequently in order to be better able to give his vote to the whole Ministry in exchange for some local advantage for his own district, or for some personal gain for himself or his friends who have been most active in the elections.

Consult Lowell, A. L., 'The Governments of France, Italy, and Germany' (Cambridge, Mass., 1914); Colajanni, N., 'I partiti politici in Italia' (Rome 1912).

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14. ITALIAN SOCIALISM. It has often been remarked that Italy during the 19th century, and especially during the period immediately preceding the establishment of United Italy, contributed very little to the universal progress of science, letters and arts. The intellectual activity of the nation was engrossed in the long struggle for national independence. It was the overwhelming absorption in this same conflict which so long retarded the progress of Socialism in Italy. Sixty years ago Italy had produced no Marx, no Engel, no Lassalle, no De Poepe, no Fourrier, no Owen, no Henry George.

After the accomplishment of Italian independence and union Milan became one of the great commercial cities and Genoa one of the most flourishing seaports in Europe; then the nation witnessed the first efforts of Italian workmen and peasants to secure something more than the expulsion of the oppressive foreigner from her soil, and the unification of their country. In other countries the *Internationale* exhausted its power in the contentions between Bakounine and Marx, *le petit* Thiers crushed the Paris Commune before the Italian working classes began their struggle against capitalism. Of "socialism" — so called — Italians had previously heard only the denunciations and theistic sermons of Giuseppe Mazzini, which, however humanitarian, are religious and individualistic and not socialistic.

Moreover the Italian fight for freedom retarded the growth of Italian Socialism in a way which has passed almost unobserved and which in the absence of documentary proof is vigorously denied by Italian Conservatives. It is, however, true that the enthusiasm which prompted Italians to conspiracy and rebellion and high martial valor on fields of battle, to secure the liberty and unity of their country, was not inspired solely by patriotism. Many Italians anticipated that with union and independence certain great and radical reforms would be obtained. For some of these warriors the patriotic strife implied socialistic ideals; it certainly admitted of a socialistic mirage. Evidence of this is to be found in many popular sayings and songs current during the early half of the century, and in expressions scattered through many printed and written documents.

From the very beginning the National party

was divided into a right and a left faction. The satirical Tuscan poet and patriot, Giuseppe Giusti, in his letters often qualifies as communists, or adepts in communism, several of the men who afterward fought for Italy. The epithet becomes significant in view of the terror which Giusti and every other loyal *Conservatore* felt when he detected even a taint of unconscious socialism in this pre-eminently patriotic struggle.

Again! After Giuseppe Garibaldi had gloriously guided his army of a thousand heroes in the conquest of Sicily, and it was necessary for him to assume the statesman's part and, as *Dittatore* of Sicily, to establish a new and adequate government in the conquered land; by the advice of Francesco Crispi and his other councilors of experience and wisdom, Garibaldi, in an almost forgotten proclamation, offered to let the islanders divide among themselves the state domain, thus clearly indicating how largely these patriots were imbued with the ideals of socialism. As long as this patriotic enthusiasm continued, there remained a vague hope that economic reform would grow out of political reform. Hence the political revolution checked socialism; both by engrossing intellectual forces that might otherwise have prepared public opinion for socialistic ideas, and by promising to achieve that economic redemption of the working classes, which in other countries socialism promised to accomplish.

But the echo of the last battle for liberty had scarce died away when many Italians realized that so far as the economic redemption of the lower classes was concerned, the Italian revolution was eloquently described in Dante's line,

"Lunga promessa coll' attender corto."
(An abundant promise and a meagre fulfilment.)

Some of the very men who with lofty patriotism had fought for the political freedom of Italy, were among the first who perceived that these expectations had not been realized. They were men trained to plan and successfully execute a political revolution, and believed that the same violent means would be equally successful in the field of social revolution. They believed that an emulator of Garibaldi, strong of will and of dauntless courage, could stand on the field of economic conflict, as he had stood on the martial field, and with equal facility achieve not less wonderful victories. Such men were prepared to listen to Bakounine's propaganda of violence, but they were not ripe for a socialism which taught respect for existing laws.

Everything pointed the same way. The prevalent sympathy was for France. Victor Emanuele wished Italy to join in the war against Prussia. Garibaldi and his volunteers were fighting in the ranks of the French armies, public opinion followed, fascinated, the tragedy of the Paris Commune. Moreover the taxes and customs duties, often on articles of necessity, pressed heavily, and a wind of rebellion blew from all quarters, against these imposts, against the men who devised them, and against the institutions for whose benefit they were levied. Poverty in the country districts was great. Italian government bonds were 40 per cent below par, the rate of exchange was 15 per cent against Italy, trade was depressed and industry arrested. Unpopular taxes are a strong inciter to rebellion, and the recent examples of successful revolt suggested a means of speedy and practical relief for the impoverished nation.

In the year 1872 Rome was released from the temporal power of the Church; that same year saw the completion of the patriotic era and the birth of avowed socialism. The internationalist doctrine, as then professed by the *Internationale*, spread over all the land. In Bologna, in March 1872, and in Rimini in August of the same year, were held the first meetings of the Italian sections of the *Internationale*. The second of these meetings proposed the international socialist congress that was held at Saint Imier in Switzerland, 15 Sept. 1872. At this same congress the deputies of five national federations — followers of Bakounine — repudiated the *autoritario* movement begun by Marx, which was the actual origin of Italian socialism.

This Internationalist movement — or militant socialism — though begun so late in Italy, spread rapidly. It soon numbered more than 50 federated sections, and possessed more than 20 periodicals. Soon there were Internationalist uprisings. The year 1873 was one of great suffering both in the farming communities and in the cities; and in the first months of 1874 strikes and tumults arose in nine cities. In the single month of July there were commotions in 16 different places in Central Italy. In August there was a widespread Internationalist movement in Romagna, and it also lasted long in Tuscany, and in Puglia there were uprisings instigated by the notorious Enrico Malatesta.

A pitiless struggle now began between the Italian police and the Internationalists. Indeed the police organization was the only real opponent, since juries were always willing to acquit. Yet, so powerful is the Italian police system — it was even more powerful then — that the new-born party endured terrible ordeals. Meetings were dispersed, associations forbidden, newspapers suppressed, the liberty of some individuals abridged, forbidding them to go to certain places or to meet certain persons or to be found out of doors after a certain hour. *Ammonizione* and *domicilio coatto* were very real political weapons 30 years ago. But public and private meetings were held, circulars and periodicals secretly printed, and the proletarian movement was not entirely suppressed until after the final insurrectionary rising at Benevento in South Italy marked the death of Internationalism.

Lacking all intellectual preparation, the product of temporary economic conditions, the dream of disordered imaginations, unable to perceive the true ideals and purposes of Italian socialism, and unable to devise a practical way of obtaining them, these anarchists and pseudo-anarchist strivings failed. Yet in the same sense as the pathological temperament of an epileptic is in harmony with his convulsions, so were these convulsive movements of the *Internationale* in harmony with actual conditions of Italy at that time. Indeed they were the only movements that could be in accordance with those unhealthy conditions.

In Lombardy the different ethnical character of the people and a better education sug-

gested that the amelioration of social conditions could best be obtained through lawful political agitation; hence it presented collectivism, and not communism as its goal. These two characteristic features of what has been called the *Milanese* dogma, gave it the name of *legalitario* or *autoritorio*. The leaders of this movement were Enrico Bignami and Osvaldo Gnocchi-Vianni, who wrote in the periodical *La Plebe*, first published in Lodi and afterward in Milan. Except in Lombardy, Italy did not support this movement for legalized socialism. Its methods were too modern, too scientific, too conservative, to appeal to a people ignorant, exasperated and with little political experience. Better rebellion and anarchy than the slow political and social preparations counseled by the law-abiding collectivists of the Milanese group.

After the failure of the Internationalist outbreaks, disputes arose between them and the *Legalitarians* and many of the working classes abandoned Internationalism. The capitalistic party waged war indiscriminately against Milanese Legalitarians and Internationalists. The leaders of these opposing extremes of socialism, involved in one common persecution and exile, soon realized that although divided on matters of minor importance, they could agree on many fundamentals, and that their only chance of success was in a union against the common enemy: capitalism and reaction.

One of the first results of this reconciliation was the adherence to socialism of the former leader of Italian Internationalism, Andrea Costa, who, on leaving prison thus addressed his friends: "Hitherto we Internationalists have been self-centered, engrossed by the logic of ideas and by the preparation of revolutionary plans, which we deemed immediately realizable, and we have neglected the study of the economic and moral conditions of the people and their immediate and bitterly felt wants. We have accordingly disregarded many of the activities of life, we have not sufficiently mingled with the masses and when, with generous impulse, we have attempted to raise the banner of revolution we have been misunderstood and deserted. . . . Internationalism has been heretofore the representative principle of a temporary historic moment in the life of our people, it cannot stand for the whole of this life. We do not mean to discard the name "International," but we want it to *become something more than a scarecrow, we want it to embrace all the socialist parties found in other countries.*"

These authoritative words were the epilogue of the dead Internationalist socialism and the prologue of the new socialism; and the year 1882 marks the dividing line between the old and the new. Now for the first time did the Italian working classes clearly perceive their objective and the means by which it could be achieved. This passing of Internationalism and the birth of the new Italian Socialism was neither accidental nor was it due to the propaganda of certain enlightened leaders. Rather was it the result of a betterment in political and economic conditions. The petty and antagonistic states, duchies and kingdoms subject to the influence of foreign powers, had become Italy, free and independent. During the 10 years succeeding 1871 the products of Italian mines, many principal industries (as silk and cotton) nearly or quite doubled in the value of their output. And this progress, with some exceptions, has continued. The political change and industrial progress as surely provided the environment and opportunities for the new socialism as the former political unrest and economic depression created Internationalism.

From the wreck of Internationalism arose two parties. One had its chief strength in Tuscany and Romagna, under the leadership of Andrea Costa, who sought to persuade the people that the time for conspiracies was past and that they should claim their rights through legal agitations. The other, in central and southern Italy where industry was languishing, and agricultural laborers desperately poor, found support from a people who maintained their reputation for impulsiveness, and the sentiment of rebellion which they had inherited from Internationalism. In northern Italy where there was industrial activity and comparative agricultural prosperity, the stern Marxist socialism also divided into two distinct movements — the rigidly political party of the intellectual socialists, and the so-called "workingmen's party," which was socialistic in intention, but which in practice adopted co-operative methods.

These four different manners of interpreting the socialist doctrine differed rather in the practical methods they advocated than on matters of fundamental importance. But all four being newly adopted were passionately sustained by their neophyte following. Then also all over Italy socialism aroused the opposition of those Democrats and Republicans that belonged to the great middle class; and as in some places socialists opposed and in other places made alliances with these parties, a new cause of dissension arose. It is hardly possible to find a clew out of this tangled maze. History here turns gossip. It is incoherent and — petty. Of these four divisions the most insignificant was that which nearest resembled the defunct Internationalism. The party of legalitarian socialism as taught by Andrea Costa, which was somewhat imbued with Internationalism, was more important. It was the Labor party (*partito operario*) which originated in the co-operative group, and the strictly Marxist party which at first comprised only a few intellectual men, both parties originating in Milan, that combined to produce the present Socialist party. The Labor party was formed by actual working men — Lazzari, Croce, Sacco and others. Fierce struggles were waged and the first victories won, struggles and victories sometimes against those Republicans and Democrats who sought to compel the Labor party to accept their leadership and protection.

In the beginning the Milan Socialists accepted the leadership of the Laborites, and candidates of both parties were found on the same electoral tickets. But at the Congress of Mantau, 1885 — the date which records the most prosperous moment for the Labor party — it was resolved that they would thenceforth make no alliance with the Socialist or any other political party. Yet in fact at the next political meeting in Milan such agreements were made. At this time men like Felippo Turati, the Italian Juarés; Camillo Prampolini, the apostle of Reggio Emilia, Agnini and Berenini, joined the Socialist party, and directed it toward a purely Marxist conception. A few electoral victories

confirmed the wisdom of this program and as the Labor party lost influence many of its best members passed into the Socialist party, which now sought to unite all interests in one compact organization.

In the next Congress held in Milan in 1891 the anarchists and the Mazzinians were routed by the Marxist socialists, who immediately began to receive large accessions from all over Italy, and the election of 1892 added to the socialist victories. Encouraged also by the colossal growth of socialism in Germany the propagandists labored unweariedly, and harmony and strength came to the party; and in the memorable Congress in Genoa in 1892, after repelling all alliances with anarchists and cooperatives, the Socialists proclaimed the constitution of the Socialist Italian Labor party — a party which, though officially dating from 5 Aug. 1892, did not in fact originate in the blending of the Milanese Labor party — an enlightened trade unionism — with the socialist movement in Milan, led by Turati, Gnocchi, Viani, Prampolini and others, and in central Italy led by Andrea Costa.

It is important to remember that in 1892 capitalism offered no organized opposition to socialism, although socialistic doctrines had been preached all over Italy for 20 years. A weak *bourgeoisie* and a strong *proletariat,* ardent in its new faith, were the best guarantees for the success of socialism. For two years this state of affairs continued, and Italy witnessed the novel spectacle of a vast political association held together by discipline, free from the bonds of secrecy or conspiracy. Out of the ranks of the *bourgeoisie* came many brave men who raised the banner of revolt against existing conditions. Cesare Lombroso, the great pathologist, Enrico Ferri, the eloquent orator and famous jurisconsult of the new positivist school of criminology, joined the socialists. They were followed by philosophers, poets, scientists and economists, in large numbers.

The Congress held at Reggio Emilia in 1893 was an apotheosis of the socialism that had vindicated the rights of the agricultural classes of North Italy, but — it was also the last action of the Socialist party which was not opposed by the *bourgeoisie.* Before the end of this year there were famine riots in Sicily, echoed also in Continental Italy. They were the inevitable consequences of the hunger of the people and the oppressive taxes. But the rioters were led by Socialists, and often socialist cries were used, hence repression took the form of war on socialism; the Statuto (Constitution) was violated and administrative deportations instituted and freely applied to political agitators, liberty of the press was abolished, and by means of seizure of documents and lists of members and imprisonments, the party was for the time suppressed. But because this extreme violence was instigated by the unpopular *bourgeoisie* and carried out by a ministry already discredited by the bank scandals, the Socialist party was not vitally injured. In January 1895, at a secret congress held in Parma, the party altered its constitution and assumed the name "Italian Socialist Party," and in the ensuing general election polled 80,000 votes, secured additional parliamentary seats and compelled the passing of amnesty laws which brought security and tranquillity. At the next congress, held in Florence, the headquarters were transferred from Milan to Rome, the seat of government and the place most suitable for political propaganda, and it was also decided to publish a daily paper, *L'Avanti,* which could carry on the propaganda in a field not reached by the 40 or 50 existing weekly Socialist papers. In the general election of 1897 the Socialist vote increased to 130,000. In the congress of this year held at Bologna the intransigeant policy was definitely rejected and it was agreed to make alliances with other democratic parties in opposition to the common enemy — the Conservatives. The party seemed on the highroad to prosperity.

Never has the desire either for personal, civil or religious liberty sufficed to rouse Italians to rebellion. Liberty has either come peacefully or else as the result of conflicts for other ideals, such as the conflict for Italian unity and independence of foreign control. Public opinion naturally favors liberty — it is there and it is convenient. But because of a racial scepticism and excess of philosophic resignation, when this liberty is lost the sacrifice is endured. Italians are easily aroused, they no less easily forget, or desire to be left in repose. Hence the socialistic party, which in public meetings lifted its voice in strident propaganda and noisy warfare, was a disturber of the peace, a mischief-maker to the *bourgeoisie,* who welcomed an opportunity to destroy it. This opportunity came in 1898. For several months previously the Socialists had been speaking against the customs duty on foreign wheat and flour, which enabled the incompetent farmers of south and central Italy to pay starvation wages to the oppressed peasants, but which intolerably raised the cost of bread to the poorly paid industrial workers in the cities. This price of bread was still further increased in 1898 by the previous year's scanty harvest. Street tumults ensued which might have been avoided by the temporary reduction of the duty on foreign wheat. Martial law was almost everywhere proclaimed, and penal servitude was the frequent sentence pronounced by military judges. Members of Parliament and journalists were condemned to prison and exile, archives of Socialist associations were destroyed and the funds of co-operative societies seized. The blow to socialism seemed mortal.

The government soon realized that this severity was not approved by public opinion and martial law was revoked; administrative deportation for political offenses ceased and amnesty was granted. But though the government, repenting its leniency, asked from Parliament laws restricting the right of association and liberty of the press, the Socialist leaders on leaving prison and returning from exile renewed their agitation and inaugurated the first obstructive tactics ever attempted in an Italian Parliament, compelling a dissolution. This parliamentary revolution marks a historic event.

In the general election of 1900 the Ministerial candidates received only 611,425 votes. Of the different opposition parties, the Monarchists received 303,891, Radicals 110,208, Republicans 119,645 and Socialists 251,841 votes.

The Socialist vote had doubled in less than three years and the Socialist members of Parliament had increased to 30. As soon as Parliament met the Conservative Ministry fell, and was succeeded by the Zanardelli-Giolitti coalition cabinet under which the Socialist party had such triumph, such influence and such dissension. Together with the Republicans and Radicals they formed the *Estrema Sinistra*, whose support was indispensable to the Ministry. But though when in the minority these components of the *Estrema Sinistra* showed ability and power in harassing the government; when, as a part of the majority supporting the new Ministry they attempted to pass from destructive criticism to constructive legislation, they showed pitiful inaptitude and quickly developed dissensions. Thus originated that crisis under which the Socialist party is still laboring.

The intense individualism and impatience of restraint inherent in the Italian nature must always be reckoned with in Italian political parties. No sooner is an Italian Cabinet formed, no sooner does an Italian political party become powerful, than distrust and jealousy enter in, and the process of disintegration begins. Though the strike in the mine districts in 1901 was largely successful and greatly increased wages and though the railway employees in 1902, by threatening strike, obtained their demands, and though every dictate of prudence suggested that the Socialist party should unite in support of the Zanardelli-Giollitti Cabinet, they quarreled among themselves. Enrico Ferri became the leader of the Socialist malcontents. The dissenting faction refused financial support to the Socialist newspaper *Avanti* because it supported the Ministry, and the director of that paper, Leonida Bissolati, resigned. Enrico Ferri immediately took his place. This division within the party was really a personal rivalry between leaders. The moderate Socialists were defeated in the Bologna Congress of 1904. In vain did they point out that the *bourgeoisie* had recovered from panic and could now fight their battles without government support. In vain did the moderates urge that the party rest content with a program of gradual reform. But the revolutionaries would have none of this. Bloody conflicts with the police broke out in South Italy followed by a general strike all over the country, which soon degenerated into deplorable excesses. As a consequence, at the next general election the Socialists lost several parliamentary seats, and in the strike of railway employees in 1905, promoted by the revolutionary group, the strikers were entirely defeated.

In consequence of the agitation resulting in this defeat of the railway strikers, the more belligerent faction of the Socialist party adopted the latest conception of French socialism as presented by Sorel, known as "Syndicalism." Such conception implies that subordinating the purely political agitation, the proletarian movement should become a vast association exclusively confined to workingmen and rejecting assistance from "the classes." Syndicalism expects the working class to oppose actively both capitalism and all government favorable to capitalism. This sentiment of Syndicalism became stronger because it was a protest within the party against the alliance of Enrico Ferri, and the Ferrists with the Sonnino Ministry which rose and fell in March and April 1906. The situation became intolerable and a National Socialist Congress was called in September 1906 to discuss the situation. In this congress it was discovered that the Reformists and the new section of socialism, calling itself "Integralists," were equally averse to the revolutionary policy of the trade unionism advocated by the Syndicalists. The newspaper published in Rome by the Syndicalists (*L'Azione*) violently attacked the party organ (*L'Avanti*), while the Integralists and Reformists in combination defeated the Syndicalist policy of trade-unionism. The flourishing condition of Italian industry and commerce undoubtedly hindered (before the participation of Italy in the European War) the spread of socialism and soothed the asperity between capital and labor.

But this very amelioration of the condition of the Italian working classes tends to enlarge the range of their necessities and accustoms them to a higher standard of living. This results in the institution of co-operative associations and leagues for mutual assistance. The Italian proletariat will never consent to a return to former conditions of privation, but will insist on still greater material comfort and less labor and a larger share in the nation's wealth. The struggle to secure these things will probably be led by the Socialist party, and in the coming conflict the opposing capitalism and conservatism will probably continue to be less compactly organized and less capable of strenuous resistance than in England and Germany. See ITALY — HISTORY FROM 1907 TO 1919 for socialist opposition to war in years 1916–17, etc.

The Socialist party faced a severe crisis in 1912. In that year the official party organization opposed the war with Tripoli, but Bissolati and Podrecca, the editor of *L'Asino*, with two other representatives, openly favored the governmental policy. In consequence they were expelled from the party by its congress. In this crisis 16 deputies out of 38 joined the Reformist party, which has since gained considerably in membership and parliamentary influence, though it has not grown nearly as fast as the Socialist party.

In 1913 the Reformist party polled 200,000 votes for its candidates, and elected 21 representatives. At the same election the Socialist party received 960,000 votes, and elected 59 representatives. In 1913 this party had a membership of 37,000. Of course the struggle between the trade unionists and the Syndicalists in the labor movement had a great influence upon the Socialist party.

Since the first day of the World War the Socialist party has been practically unanimous in opposing participation in the war. As far as the war is concerned the industrial movement is in full accord with the political movement. The industrial movement is divided into two distinct groups. The one is the so-called Reformist group; the other, the Syndicalist organizations. Each of these groups possesses its own central organization. The Confederazione Generale del Lavoro is the older federation. It indorses the war-position of the Socialist party, while the Unione Syndicale condemns all political action and sees in the general strike the chief weapon of the working-class. This organization is patterned after the French General Confederation of Labor.

In May 1916, in the Ministerial reorganization, the Reformist party succeeded in placing Bissolati and three other members in the Cabinet, where they were the most ardent supporters of Italian intervention.

The Socialist party has representation in nearly every municipal government. In 1917 about 800 towns and cities had Socialist administrations. According to the reports of party officials in 1917, the membership had risen to 64,000 in good standing, besides at least 25,000 former members at the front, who also are regarded as members in good standing. The strength of the Socialist party is at present by far greater than that of any single capitalist party. ED.

JOSEPH SPENCER KENNARD,
Author of 'Italian Romance Writers,' etc.

15. THE ITALIAN ARMY. The Italian army follows the political movement of the nation. As the various regions of Italy were united in a short space of time to Piedmont, so all the military forces of the other states of the Peninsula united themselves with the military legions of that little kingdom.

It was necessary, however, to combine in one organization all the various little armies with their diverse systems and laws, and we have an instance of this in the action of the illustrious General Fanti who adapted the system devised for French troops to the needs of Italy.

The basis of Fanti's system was compulsory military service, by which all citizens between 20 and 39 years of age were compelled to serve in the army — in the line for the first few years and later on in the militia.

Another characteristic of this regulation was that each regiment should be drafted not from one special region, but from various parts of Italy. In this manner the provinces of the kingdom would not feel that they were being matched one against the other, and the provincial spirit would make way for a greater national spirit.

Fanti's system remained in force for many years, but it is now deemed advisable that each regiment should recruit its forces from the citizens who reside in the neighborhood of the army at the commencement of hostilities. The examples of the War of 1870 indicated the need of important changes in the military systems, and General Ricotti provided for these by modelling the army, as much as possible, on the Prussian system, reorganizing special departments of the army, requiring greater education in the officers, and facilitating mobilization and creating the bold Alpine regiments which are stationed on confines of the kingdom to defend its borders.

Subsequently, through the efforts of Generals Mezzacapo, Bavel, Marselli, Milon, Cosenz, and above all, General Luigi Pelloux, the government saw that imitating foreign military systems would not suffice for the defense of a nation, but that every nation should have some military characteristics peculiar to itself. Hence arose the present military organization of Italy, by which the principal strength of the army is in the infantry, to which are subsidiary a great number of cannon and a well disciplined cavalry. An extensive reorganization of the Italian army was undertaken early in the 20th century.

At that time only seven Alpine regiments were stationed in the Alpine valleys, two regiments of grenadiers stationed in Rome, 94 regiments of infantry of the line scattered throughout the kingdom. There were 12 regiments of sharpshooters, a special infantry with purely Italian characteristics; their record is world-wide; in them live the traditions of the Crimean War, and it is to the credit of General Lamarmora that he gave to Italy such a noble contingent. And as for its sturdy soldiers, speeding like arrows, their plumes flying in the wind, they pass in review before the people, who feel that their hearts beat in union with their strong defenders.

All the regiments of the line have, either at headquarters or as near as possible to where they are stationed, a base of supplies. Each regiment has 12 companies, with three battalions of four companies each.

The artillery, before the European War, was composed of 24 regiments, part of them in the fortresses. There was a regiment of mounted artillery and one of light artillery, beside the five that furnished shoemakers, miners, machinists and bridge builders, the engineer corps, supplies, officers and soldiers for the telegraph and telephone service, for the setting free of carrier pigeons, for the management of balloons and for every special mechanical and chemical need required by a well-organized army. The regiments of cavalry have each special and distinctive stripes, the headgear (Colbacco) special to the light cavalry, the helmet for the lancers.

The instruction of the cavalry is with a view of making it an active factor in an unexpected attack or in routing the enemy already scattered by the fire of the soldiery, and to detach the reconnoitering service to the van of the army.

The problem of horse supply for the cavalry is a difficult one for Italy, hence she is obliged to limit the number of her cavalry. The cavalry officers are excellent horsemen. At the head of small bands of soldiers, they traverse the most rugged portions of the country, climbing its mountains and dismounting promptly ready to attack in places which seemed inaccessible.

It is owing especially to Inspector General Majnoni (who was Minister of War during the administration of the Honorable Sidney Sonino), that such a practical direction was given to the instruction of the Italian cavalry. All the professions are represented by the army; thus they have physicians, veterinarians, commissaries, accountants, all vested with a certain military rank of varying degrees.

The legions of Royal *Carabinieri* are an important factor in the strength of the army. These, beside being the most perfect body of police known to Europe, rendered eminent service in the national defense and took an honorable part in all the wars of Italian independence.

Every army corps consists of two divisions of infantry, and has besides a proportionate number of cavalry, artillery and engineers, a commissariat department, a department of health, hygiene, munitions, etc.

These divisions consists of two brigades of infantry, provided with the departments that are strictly necessary for the troops. There are also some independent divisions of cavalry.

Each infantry brigade is commanded by a major-general and is composed of two regiments.

In time of peace the work of the levy, or annual conscription, is entrusted partly to the civil authorities (mayors and prefects), partly to military districts.

The military district is, in fact, the bond of union between the people and the army. It holds the register of all enlisted men and soldiers on unlimited furlough. It notifies them by police proclamation of the call to arms, subjects them to medical examination and distributes them in the various corps.

The annual contingent of recruits amounts (in time of peace) to about 500,000, from which must be deducted those that are disabled by physical ailments, by various objections and by family reasons, and this leaves only about 100,000 enlisted men a year. The enforced military service, the time during which a citizen, in time of peace, must serve in the army, varies from a minimum of 10 to a maximum of 34 months, and taking into account the loss by sickness or other causes, we see that the average strength of the Italian army in time of peace is 215,000 men.

A cause for exemption from military service, other than a specific malady or reason for unfitness specified by the law, is the fact of a man being an only son, of having had brothers who have borne arms, of being the support of his own family or of his nearest relatives. Thus it is seen that the flower of the nation is called to defend the country, for such defense requires in the ranks a number of men of robust constitution and good morals.

There were authoritative estimates to the effect that, should war occur, the regular army could place more than half a million men in the field, in addition to 200,000 militia (*milizia mobile*), while the Territorial Militia and the Communal Militia defended certain portions of territory and maintained public order. With a view of making Italy a military nation and diminishing the burdens of the army, the *Tiro a segno Nazionale* was instituted, so that young men could practice sharpshooting (firing at a mark), and other important warlike exercises.

The government contributed $120,000 to initiate this patriotic institution, which was so warmly advocated by Garibaldi, and which is destined to develop greatly in the future. As it is evident that every war in Italy will be carried on most bitterly in the northern regions, the chains of the Alps, Ligurian, Apennines, and the Riviera of Genoa and Venetia were covered with fortifications, which have been extended from year to year.

The rifles of the infantry (1890–91 model), are of small calibre, with long, rapid discharge, and are one of the best weapons known. There are in use steel cannon of 75 millimeters calibre; these cannon, which can be dismounted, are considered the best in the world, even superior to those in use in France. Generally speaking all the munitions of war are constructed in the arsenals, laboratories and foundries of the state with military organization.

The officers are trained in appropriate military schools — the infantry and cavalry in that of Modena, the artillery and the engineers in the Military Academy of Turin, and in order to enter these institutions one must pass a special examination and have obtained a high school (Lyceum) certificate.

The complementary officers, i.e., those young men who serve only in time of war in subaltern capacities, are taken from the one-year volunteers, or those recruits who belong to the professional class; and being devoted to serious studies are permitted to serve 12 months only, in time of peace.

The cavalry, before taking service in a regiment, are obliged to take up a special course in the Pinerolo School; the artillery and engineers must pursue their studies in the Technical School at Turin. There is, besides, at Parma, a school where the infantry officers perfect themselves in the study of their profession.

As it was extremely difficult to diffuse military instruction in the art of command, there was established in Turin the «School of War» which has a large attendance, as its students have special advantages for the pursuit of an army career, and many even aspire to a position in the *État-Major*.

The Italian army before the events of 1911–12 and 1914–18 had not tried its strength in a great European war, for in 1866 it had only initiated its present organization, in 1870 only a small portion of it undertook the occupation of Rome, and in the colonial campaigns its strength was not proved as a whole, but it was represented by a small portion of the army, hastily mobilized.

But if on these particular occasions it had no way of putting all its machinery to the test, that did not prevent the special attribute of its officers — bravery — and the excellence of its soldiery from being recognized. In the unfortunate battle of Adua a few thousand soldiers knew how to resist an innumerable horde of Sciyans and Abyssinians, and the acts of valor they performed excited the admiration of Europe, and the death of so many heroes, a Toselli, a Galliano, an Arimondi and a Dahormida, gave Italy the right to raise her head proudly on the field of defeat.

The people are proud of their army, for they behold it ever ready to march into danger, ever ready to come to their assistance; in the cholera year in Naples; in the serious inundations of the Veneto; in the earthquake of Liguria and Calabria; in the disaster of the volcanic eruptions, always and ever the Italian soldiery fraternized with the people and endeavored to the best of its ability to aid them in their misfortunes, thus demonstrating that not alone in war may an army filled with noble sentiments be of benefit to its country.

Immediately after the war with Turkey the active army's strength was 306,300 men (peace establishment). The war in Europe, 1914–18, tested the flexibility of its organization, and the extraordinary result was that in three years, increasing tenfold, it became formidable even in the modern sense; for in 1916 the war effective of the Italian army was more than 3,150,000.

[Gen.] FORTUNATO MARAZZI,
Member of Parliament, Formerly Secretary of State for War.

16. THE NAVAL MARINE. The confirmation of the Italian unity as an accomplished fact is coincident with the feverish anxiety that manifested itself in all the European countries in the great transformation that

occurred in the marine service through the change from sailing vessels to steamships. At that time there was going on in Italy a complete reconstruction and reorganization, not only of the material, but also in the personnel — especially of the officers.

Officials.— In 1859–60 there existed in Italy only the Sardinian and Neapolitan marine, for the other states of Italy had no marine. The great diversity in the general management of these two navies, the difference in ability and culture in the upper officers — who were conspicuously superior in the Sardinian navy — caused a decided lack of that harmony which is one of the essential factors in union. It was deemed necessary to combine the two naval schools of Genoa and Naples; and Leghorn was selected, in a region that might be called neutral, as the site of the new Naval Academy. The highest results were obtained in every respect in this institute, for thanks to a critical and careful selection of students, it produces to-day officers who will bear comparison with those of any navy in the world.

Equipment.— Until a few years ago Italy possessed a flourishing merchant marine of sailing vessels, from which were taken a number of the best officers for the naval service. The excellent seamanship of the Ligurian sailors was so well known that they were sought by foreign navies. But after the change from sail to steam, and the consequent diminution of sailing vessels, the large number of sailors on all the Italian coasts, and especially on that of Liguria, gradually diminished.

The great dockyards for construction, steel works and industrial establishments of all kinds arose in the course of a few years, as if by enchantment, on the two sea coasts of Genoa, and they have caused a fruitful and vigorous awakening of the energies and economic resources of the country. But they have absorbed for the most part the better elements, which, according to ancient tradition, were due to the marine life.

At the present day, the supply of seamen is not equal to the demand, and the state supplies the deficiency by voluntary enlistment and levy. The personnel thus enlisted consists mainly of the special branches of the service and particularly gunners and torpedo men.

The Italian sailors are not given by nature or custom to the indulgence in wine and liquors, and they have the well-deserved reputation of being well disciplined, sturdy and of being able to endure an exceptional amount of fatigue. The descendants of the old Greeks, who colonized the coasts of Calabria and of Sicily, are to-day the best element in the manning of the Italian navy.

The inhabitants of the coast of Calabria and Sicily have been fishermen from their infancy. Accustomed to all kinds of fatigue and to every sort of weather, sober as anchorites, they pass their lives with an oar in their hands, thus tempering the muscles of their arms and chest, as the steel is tempered in the fire. And it is this valuable element which accounts for the brilliant victories constantly gained by the Italian seamen in the international regattas over a long course, as in the regatta at Shanghai in 1905 between a vessel of the Italian navy, *Marco Polo*, and one of the strongest vessels of the American navy.

Unfortunately, owing to the demands on the naval exchequer, the pay of the men is wretchedly small, and for that reason very few remain in the service after their obligatory term expires. This is a very serious inconvenience, especially where gunners and torpedo personnel are concerned, for they require a long and expensive course of instruction. Consequently, recent years have seen the beginning of a movement to improve the condition of subordinate officers and the specialized personnel, to induce them to continue in the service. Special attention has been given to the instruction and selection of gunners.

Armament.—At the time of making the change from sailing vessels to steamships, the industrial production of Italy was so limited that she was obliged to have recourse to foreign industry, and to France in particular, both for the building of ships and for the manufacture of armor. But a few years of active work were sufficient for the shipwrights to transform themselves into the best kind of iron workers, and the government arsenals obviated the need of recourse to foreign manufacture, and they were able to build and equip through their own efforts the present day armored men-of-war. Flourishing private dockyards were established to compete with the government manufacture and Italy has been able to sell to foreign countries a considerable number of armored vessels, and to take orders for others.

Steel Works.— Government production is for obvious reasons more costly than private production, and in order to expedite Italian emancipation from foreign industries, also in armored vessels, the Italian government made provisions favoring the establishment and development of the large steel plant in Terni, which attained such a condition of efficiency as to produce on a large scale the highest grade of armor. Unfortunately, this private concern sought to raise its prices to the highest mark. This determined the government to give its orders for armorplate to foreign shipbuilders, and to establish government steel works to check private avarice.

Present Conditions of the Italian Navy. — About 35 years ago the Italian navy held the third rank as a naval power among the principal nations of the world, but heavy financial responsibilities had diminished the exchequer considerably just at a time when the other continental nations were awakening to the necessity of increasing their maritime power and directing all their efforts to the development of the navy. And thus it happened that in the course of a few years the Italian navy retrograded to the seventh rank. But the marvelous progress in industrial commercial activity gave hope that before long there would be an improvement in this respect and before the European War she had risen to sixth place, superseding Austria-Hungary.

The period of economy in the War Department added to a policy of retrenchment on the part of the government have not failed to bear fruit, for the national budget shows a period of increased prosperity and the naval estimates for the fiscal year ending 30 June 1916 were, in amount, $54,481,415. It is true nevertheless that with this annual expenditure Italy might hope for a greater condition of efficiency in the navy than exists at present; but the dis-

proportion which exists in Italy between expenditure and naval force and from which Austria and other states do not suffer is partly owing to the enormous number of government arsenals existing in Italy, the products of which are very costly, and which for territorial reasons it has been impossible hitherto to close.

The Italian navy in 1916 consisted of the following vessels (completed at the end of that year or at an earlier period): six dreadnoughts, seven predreadnoughts, eight armored cruisers, 16 protected cruisers, 10 torpedo gunboats, etc., 48 destroyers, 71 torpedo boats and 19 submarines. Rest assured, Italy will not spare attention and sacrifices in order to attain a naval efficiency, which shall be equal to the exigencies and the just political and commercial aspirations of the nation.

Consult Tamaro, A., 'L'Adriatico — golfo d' Italia' (Milan 1915).

[COUNT] CANDIANI,
Admiral of the Royal Italian Navy.

17. RELIGION IN ITALY. To represent the present state and condition of religious life in Italy is a difficult matter on account of historical and ethnological considerations, and those who have tried to explain this religious life have given expression to the most varied and opposite opinions on the subject. There are some who say that in Italy there is not now and never has been a true religious spirit, but on the contrary a constant and universal indifference; that the official religion and the rites of the Roman Catholic Church are nothing but a travesty of pagan ceremonies; that everything in worship is external and superficial and is a reflection of the sentiment of classic art, and of the political traditions of the Latin races. They say that the Church is a Christian embodiment of the Roman Empire, and of that instinct of government and of domination which Virgil immortalized in a memorable verse.

On the other hand, some maintain that there has always been a current of mystical inspiration through the ages of Italian history, together with the official religion; that evolutionary Catholicism has in Italy as large a following as elsewhere. This is evidenced by the interest aroused by the condemnation of Loisy, Bonomelli and Fogazzaro; and that Christian Democracy, notwithstanding its recent condemnation by the Pope, still retains the same vitality as was shown during the pontificate of Leo XIII.

The famous formula of Cavour seems to necessitate the absolute divorce of Church and State; and the indifference of the State to all that concerns the religious conscience of the Italian people is undoubted.

In France the rupture of the concordat and the subsequent anti-religious proceedings of the government threatened to lead to an open conflict between the Church, jealous of her prerogative, and a government which was not only secular but even hostile to religion. In Italy, on the other hand, the secular sentiment of the government is indifference to all that concerns religion. Religious neutrality has been converted into religious annihilation.

This attitude of careless indifference induces political weakness, and is the cause of serious difficulties for the government, as well as for the Italian people.

The problem of divorce is one of many questions in regard to which the instability of our ecclesiastical polity is a source of danger to the country. There are also serious difficulties in Italy's international relations, especially with the heads of Catholic governments. Notwithstanding the Law of Guaranty the relations between Church and State still remain indefinite on many points. The responsibility of the ecclesiastical authorities for the care and protection of the works of art which everywhere adorn the churches has never been defined by law; religious instruction is imparted in the schools in some communities, while in others it is excluded. This confusion will result in obliging the State to take charge of the primary schools, owing to the fact that the government never took a firm stand on this problem.

The danger to public morals and to the family life of the citizens is still greater, on account of the uncertain relationship between civil and ecclesiastical marriages; and although there was a discussion in the Senate a few years ago about the draft of a law advocating the precedence of civil marriages, matters remained as they were before, the Senate relying on the old maxim, "Let sleeping dogs lie." But in this case there can be no rest. As the clergy frequently perform the religious ceremony of marriage when there are previous obligations and liaisons, cases of civil concubinage are frequent, and there is no way of preventing eventual desertion. This deplorable state of affairs, equally lamented by both parties, can only be remedied by conquering the hostility to civil marriage; an unjustifiable hostility because in its religious aspect the sacrament with its solemn character would give the final sanction to a contract founded chiefly on personal interest.

For the Italians who have the artistic instinct and a taste for external display, ceremonials are living and substantial things, and not mere superficialities, as the Catholic Church knows well.

The difficulties created by this state of affairs is also felt by the Church itself. The Italian government has never shown by its actions that it understands the benefit that modern Italy would derive from having the support of the inferior clergy, particularly the clergy of the rural parishes.

Against the inflexible hostility of the higher ranks of the priesthood the government would have found a powerful ally among the inferior clergy for the reason that they are closer to the people and could attract them to their side in a thousand ways, thus resolving in a simple and practical manner the problem of elementary instruction — at least in the rural districts. The country parish priests and the curates in small cities are in a painful position as regards the civil authority, and more than one "Don Abbondio" would consider it a blessing to see the king and the Pope at peace, and the throne and the altar reconciled.

As the separation of the two authorities may explain, if it does not justify the indifference of the Italian government to all questions pertaining to religious and ecclesiastical polity, so the heated political discord after the occupation of Rome, confounding politics with a question of faith, gave a seeming excuse to the irreligion

of many political men, and under the guise of a kind of patriotism condoned their frequent attacks on the interests of the Church, and at the same time constrained the great majority of Catholics, even to this day, to refrain from participation in political life, thus robbing parliamentary life of that rich interchange of ideas which would doubtless have restored its prestige which had sunk so low in the estimation of the public.

There was in truth a party widely diffused throughout Italy who sought to adjust the painful breach; and at one time — in 1887 — it appeared as if a reconciliation would take place through the action of a number of persons whose representative was Father Tosti, and who believed it possible to be good citizens as well as good Catholics, to love and serve their country and yet to be devoted to the Church. But although there was no doubt of the advantages that the Italian government would derive from the new order of things, especially as civil liberty and the unity of Italy had always been an intangible possession, it was just as manifest that the Vatican could never officially withdraw its solemn and repeated declarations. Nevertheless experience has shown that a *modus vivendi* is not only possible, but that a silent renunciation has already taken place. It was so manifest that the fall of the temporal power had no evil effect on the spiritual power of the Church; and the impossibility of a *restitutio in integrum* was so evident that the younger and more cultured clergy felt that there was a renunciation, and an implied understanding. The fact that the younger Catholic party, in accord with the encyclical of Leo XIII *Rerum Novarum*, had entered into economic and social action as the *Christian-Democratic party*, signifies that a larger field was open to their activity, and that the policy of revenge was abandoned.

It is true that Pius X hastened to restrain the impetuosity and curb the ardor of the young Christian Democracy; but while not revoking the *il non expedit* he himself agreed that the Italian Catholics should take part, wherever it seemed advisable to the local ecclesiastical authorities, in all political elections, and should sit in the Parliament at Rome. This attitude was a tacit recognition of Rome as the capital.

Thus it is that to-day the political question cannot excuse indifference on the part of sincere Italian patriots to the Church and to religion, as it could 36 years ago when the Roman question arose, and continued and violent protests were heard from the Vatican. With the deprivation of its temporal power, the pontificate, even in the eyes of Protestants and Freethinkers, has gained in spiritual authority and acquired a certain dignity. For that reason today the conditions are more propitious for a religious revival than 10 years ago. The "Bank Scandals," the corruption in some branches of Italian public life, and occasional acts of violence, induced a feeling in the minds of many that Italy needed, if not religion, at least a moral regeneration. Many public men of the new generation believe that it is not incompatible with their patriotism to give a religious education to their sons, and feel that the worship of patriotism and of liberty alone cannot satisfy all the needs of the soul and of modern life.

Thus there originated a moral union, which was initiated in Rome in 1894 by a group of chosen men as a result of the lectures of Paul Dejardins and in imitation of the Societies of Ethical Culture started in America, Germany and other countries by Adler, and which are still active. Notwithstanding their noble efforts, the work of this Italian society was not a success, and the journal *L'Ora presente* ("The Present Hour"), which was the organ of this praiseworthy society, although well conceived and edited in a liberal and enlightened spirit, did not succeed in revivifying and renewing the public spirit of the country, and was short-lived.

On the other hand, every attempt to reconcile the Catholic Church to the modern movement of ideas seemed to be futile. As regards its relations with international culture, whether in the line of thought, or of social life, it has that tendency to fortify itself behind the rigid inflexibility of dogma of authority and discipline at the least breadth of modern thought, more especially in the land where it has its historical seat and centre of power.

The Roman Catholic Church for long centuries marched with the times, and it had that marvelous power of adaptation which enabled it to survive the wreck of many empires, to hold its own amid varying events, and to issue victorious from the treachery of foes within and the persecution of enemies without its fold. In its apparent immobility, it progressed in doctrine and in action. The *nil immutetur in ecclesia* was rather a rule of internal discipline than a precept of its active life.

It welcomed the culture of ancient Roman and the political traditions of the empire. With that good sense that characterizes the Latin race and which was its strength, the Catholic Church knew how to gain advantage from the uprising of the orders of mendicant friars in the 13th century. It made the teachings of Aristotle the foundation of her philosophy, and in the humanitarian period welcomed Platonism. Under the name of culture it knew how to make use of the classical Renaissance through the *fine arts*, raising them to that magnificence exemplified in the Vatican chamber, and in the Sistine Chapel. This regeneration culminated in the Council of Trent.

It seemed as though its power of adaptation and assimilation had been exhausted in that effort and the secular evolutionary tradition lost. The Church from this time smothered every live movement of free thought, although consenting to the work of literary and historical learning and — where they did not touch on dogma — the physical sciences. She would not affiliate with the three great movements of the 19th century — that of Italian national liberty, the socialistic movement and the modern scientific movement. After the vain hopes of 1848, the Church contrasted the Unification with the Freedom of Italy, and if Leo XIII in his encyclical *Rerum Novarum* appeared to arouse the Church to new social action, his succeeding encyclicals, and those of Pius X, discouraged the Christian Democracy, thus extinguishing all socialistic vitality in the younger clergy and the Catholic laity. It was the same with the sciences.

It was certainly a great benefit to the students of history when Leo XIII opened the

archives of the Vatican, and the Italian clergy have taken a notable place in the work of the scientific laboratories. But as the Holy See and the doctrine of papal infallibility closed the door on all independence of thought, it was natural that philosophy should also be officially proscribed by the Church, and thus by the act of Leo XIII the scholastic became the only true and sane philosopher. We hope that it will not be the same with biblical criticism, and that the commission selected by Leo XIII (in many respects liberal-minded men) will not risk the suppression of enlightened biblical study, of which the younger Vatican clergy have given praiseworthy examples.

However, the news that they found a dogmatic confirmation of the Mosaic origin of the Pentateuch made one fear that even in this respect the Roman Catholic Church desires to close every channel to modern criticism, as was done in the condemnation of Loisy, in the retraction imposed on Monsignor Hulst and other liberal, energetic Catholics. Just so in the recent condemnation of Bonomelli, of Fogazzaro, and his novel 'The Saint,' and of Christian Democracy it is seen that the restrictive and irreconcilable attitude still obtains in the bosom of Roman Catholicism toward every movement for freedom of thought.

Notwithstanding all these signs of rigid adherence to the central traditions of the Catholic Church, there is a noteworthy revival of religious life if not in the Church, at least all around it, in Italy. For this reason what Harnack wrote some years ago is not exactly true to-day — that Italians were two extreme poles, Papistry and Atheism. He did not know that there would be many Italians who would consent that Italy should to-day be at the head of the movement of religious reform in the Catholic Church, as Harrier Reid affirmed in reviewing Fogazzaro's ideal works (*Monthly Review*, September 1906). It is not a question, if it ever was, in Italy, of a vague and unorganized aspiration. This is something more, and if the *Will to Believe* is not quite religious, it is nevertheless, as Nietzsche declares, not a negation; and there are not wanting among us signs of the need of a renewal of faith, or at least of a greater regard for religious matters.

Little or nothing can be hoped for from the government in this respect, as long as the political relations between it and the Church continue to be strained, and as long as the traditional policy lasts of abstention from all that concerns religion. The state could never be favorable to religious instruction in the schools by the clergy, who might educate subjects as rebels, or traitors. On the other hand, the general lack of theological culture among a cultured laity, especially after the abolition of the theological faculty in the university, may lead to a consideration of a serious and effectual form of instruction. The *bourgeoisie*, of which the government is only a reflection, is saturated with Jacobinism; and Italian liberalism is not only legitimately anti-clerical, but also anti-religious. The government, liberal and non-religious as it is, and should be, has never appeared to be aware of the social and political value of the religious life among the people that it governs, and of the great truth taught by history — that religion is the strength and the beginning of all national life.

In addition to all this we must remember that what was called the Popular Party in Italy, and more especially the Radicals and the Socialists, were at least the indirect supporters of each ministry, which, without them, could not have long remained in power, and that they brought into Italian public life the most determined opposition not alone to the Church, but also to all religious matters; and their words were assiduously propagated among the people as the words that would free them from that religion which they looked upon as the traditional stronghold of authority and of the ruling classes. We notice, besides, that in science — official science, so to speak — in Italy, positivist theories and tendencies still generally prevail, whilst in more cultivated countries they have lost ground, as might be seen at the Congress of Free Thought held in Rome three years ago.

There is not much to be hoped for from the action of other religious bodies in Italy. In spite of the multiplication of evangelical centres and literature, especially the Waldensian, they remain only isolated instances, and the entrance of Protestanism into Italy meets with the same opposition to-day it encountered in the time of Luther. The nature of the Italian race which demands in addition to the religious sentiment the satisfaction of its vivid imagination and of the classic sense of beauty and of ceremonial form, is foreign to the inner spiritual individuality of the religious life peculiar to northern races; it loves the association and social union of souls united in a common worship and solemn and magnificent rites.

Nevertheless, whoever should deny that there is a breath of religious life in modern Italy would be greatly mistaken. The discussions raised by Fogazzaro's book, especially since his condemnation by the Church, were not owing to the literary value of the work, which is but slight, nor to his acknowledgment that he had not the courage to retract, but to the idea formulated in the book of a reform of the Church. It is true that the promulgation of these ideas are limited to a group of cultured persons, and it is not to be expected that a successful move for religious regeneration can extend to the people from that source. Then again, the sympathy for "Francescanism," whence arose the society of Saint Francis d'Assisi, founded by Sabatier, is more historical, erudite and artistic than religious. The true religious movements always originate in the minds of the common people.

We must distinguish between the operative masses of the cities, agitated by the irreligious propaganda of socialism, and the rural population among whom the religious spirit is a living reality. In the southern part of the peninsula and in Sicily, particularly in the rural districts, religious belief often becomes dense superstition. An idolatry of saints and images, a belief in signs, omens and fetichism, rules the life of the people, sometimes accompanied by vicious customs and personal violence. Centuries of poverty, illiteracy and oppression account for this in part; but the Oriental character of these mixed races chiefly accounts for the frank sensualism, vivid imagination, intense emotionalism, impulsivity, semi-pagan worship of beauty and gorgeous ceremonial, and blind belief in Fate, which characterize their religion. Increasing education and better economic conditions will

gradually alter all this; and even now those who look beneath the surface will discover much ignorance and simple virtue sustained and comforted by faith, by acts of abnegation and by admirable self-sacrifice. These are, of course, less *en évidence* than the more numerous social crimes and acts of violence; but they are there, as a source of inspiration and a guiding influence. In truth, this popular religious influence, especially enduring in the rural districts, is like a groundwork formed by the old current mysticisms which, in times past, created in Italy an original form of sentiment and of religious consciousness.

Italy gave to Christianity, Saint Benedict, and Saint James of Fiori, Francis of Assisi, and Catherine of Siena, Savonarola and Saint Bernardino, Philip Neri and Carlo Borromeo. And from religion was drawn the inspiration that prompted the works of those "Spiriti Magni," Dante and Giotto, Fra Angelico and Petrarch, Brunellesci and Columbus, Michelangelo and Tasso, down to Rosmini and Manzoni. Now the popular form of Christianity — that of Francesco d'Assisi — is a purely original and national form, characterized by a serene and exalted temperance, far removed from all extremes of penance or ascetic discipline, as from all forms of doctrinal dogmatism and intolerance.

And one cannot better estimate the truly Italian character of this form of Christianity than by comparing the character of Saint Francesco with that of Saint Domenico, Catherine of Siena or Ignatius Loyola.

It is noteworthy that in the saints who were purely Italian, mystical virtue and religious inspiration were always combined with remarkable power of action in social matters. For that reason they were able to work in accord with the Church, which was able and knew how to make use of their influence in moments of grave peril. The Roman pontificate by its wonderful faculty of adapting itself to the moral, social, artistic character of the Latin races, and more particularly the Italian people, was truly for long centuries an Italian institution. But those who to-day claim that among the peoples of mediæval Europe the Italians were those whom Christianity found and left the most pagan of all, speak truly of the past, but at present and possibly in the future an international industrialism is preparing for a great modification of the historical heredity of the race. They are equally extreme in asserting that the papacy will always be a *dictator to the consciences*, as it certainly has been in the past; a necessity in governing a people in whom the religious sentiment was never associated with a deep knowledge and liberty of inspiration and of investigation which gives such a diversified character to the Christianity of the northern races. It is well to remember that the papacy had in history a national and official character, and the Italian people, by a species of historical instinct, felt that the Latin and national spirit and traditions were really represented, not by the empire, but by the Church, and it was therefore by nature Guelph, and anti-imperial, that is anti-Germanic.

For this reason and under the new conditions it can no longer respond to the exigencies and requests of a people who have the deepest inner religion. I do not think it prudent to affirm, as others have done, that "nothing living or new can ever again arise through the spontaneity of the popular faith," or that the Catholic Church is absolutely incapable of reviving in itself the religious spirit. Indifference characterizes the *bourgeoisie* who are not the truly representative Italian masses, who may yet prepare some surprises and an unexpected outbreak of faith inspired by that need of religion that Mazzini, himself one of the most deeply religious spirits of our age, called "the universal breath of humanity." Should a man of the ideal greatness of a Francesco d'Assisi, or of a Savonarola, rise up not in the name of a dogma, but in virtue of active love and social charity toward his fellow-creatures and speak words of freedom, the Italian mind might yet follow new phases of Christian idealism and civil greatness which would be incompatible with modern liberty.

The Italian Catholic is not lacking in religious idealitv and spiritual potentiality. It is good to recall the romantic and spiritual Catholicism of Manzoni, Pellico, Rosmini, if only to convince ourselves that the Italian genius and the Christian spirit may unite to form a kind of intellectual greatness, and that the Christian conscience — in its Catholic ideal — may well be compatible with a certain spiritual liberty. It is doubtless true that among the Italian Catholics the performance of external acts such as are required by the Church too often goes hand in hand with intellectual incredulity or indifference, and sometimes as in the case of the rough, illiterate peasants, especially in the south, also with crime. The type of *Ser Ciappelletto* is ever alive and real; and of this union of outward religious observance with immorality of life, the history of the Renaissance gives us enough examples without quoting others.

There is no doubt that the profound sentiment of individual responsibility and of sin presented to the conscience by continual introspection makes it less possible for those nations who have embraced Protestantism to understand this compromise with immorality. But we must bear in mind that that very imaginative faculty that prevails in the Italian mind may aid in keeping alive the sentiment of the divine, and in discovering it in every natural object (you recall the Canticle of the Sun by Saint Francis); and that in a Catholic family of good life, the purity of religious and Christian sentiment is not inferior to that in a religious evangelical family, notwithstanding that the latter is provided with more religious instruction. If in one there is more spiritual life, in the other there is a sense of authority and of discipline, and a coefficient of moral greatness. However, if one considers the conflict between Church and State in France, that kind of "Serrata" to which the French clergy lend themselves in obedience to the command of Rome, it shows a noble example of discipline and solidarity.

A phenomenon worthy of attention and a possible index of an internal Catholic regeneration in Italy is the importance that the laity are gaining in the life of the Church, as was pointed out to Germany in a notable book by Professor Ehrard. The Catholic activity of the last few years is owing greatly to this fact, and even to-day, although disapproved by the Pope, the "Lega Democratica Nazionale" is declared publicly to be independent of the Church party, and thus assumes liberty of action in its economic and social program. The motive of all this

certainly was not a religious one, but it doubtless will exercise a salutary reaction on the religious life. Thus the laity may be the means by which the Church may unite with modern culture. By its means the central authority of the Church may contribute indirectly to reawaken the religious sentiment in Italy, as she is still in principle, if not in fact, the greatest spiritual power in the world. And in this the personal character and initiative of the Pontiff play an important part. Now while Leo XIII was a diplomatic Pope and a politician, Pius X was an essentially religious Pope. His main object was to strengthen the internal discipline of the Church, or *instaurare omnia in Christo*, as he expressed himself. Meanwhile the history of the Church teaches us that popes of that temperament make many difficulties for the Church, for they look neither to the right nor the left but follow out their own idea. Leo XIII, a more liberal and more subtle spirit, who understood how to unite the Church with the states of Europe by *lenti giri e con maestri passi*, to quote Ariosto, would probably have succeeded in avoiding the Church's conflict with France. But from the simple and direct mind an impulse may be communicated to the religious conscience of Italy.

The condemnation of democratic Christianity although perhaps dangerous to Catholic interests and to the social organization of the Italian Catholic party is induced by fear that the younger Italian Catholic element in its social and political action may lose sight of the true religious scope of the Church.

We cannot eliminate religion from our life. And as the State cannot but acknowledge the great power of social and political action, it belongs to the Church to contribute to the renewal of spiritual vitality, instead of yielding to worldly and political aims as she formerly did. The Catholic Church could also purify and simplify the ritual, bringing the liturgy closer to the intelligence of the people by the use of the vulgar tongue, limiting and rendering more intelligent the worship of saints, elevating Church music (as did Pius X by restoring the Gregorian music), and instructing the clergy in the culture of the arts. In this way the clergy and then the people would restore to the sacred images the dignity of religious art, in the place of all the paltry and unattractive ornaments that now disfigure them. External nature may lend its aid to the religious sentiment in a people born to art and beauty; and the crosses raised on the summits of the Alps and Apennines may prove to be symbols of this regenerated religious spirit.

But above all things the popular reading of the Bible and instruction in the New Testament should be diffused in order to destroy that indifference which is the greatest enemy of religion in Italy; and the people should be made to feel that the mediation of the priest cannot suffice for the needs of the soul, even of a Catholic; and religious truth should be presented in a manner to display more vividly than is now done the incompatibility of immoral life with a Christian conscience, and the inefficacy of religious rites alone to reform a sinful life.

But it happens also that the Christian Church, and more particularly the Roman Catholic Church, recognizes two fundamental necessities of the modern spirit; one that regards the system of faith, and the other that refers more especially to the Church organization as a social institution, which alone can bring it in touch with the life and culture of our day. The doctrine of the immobility of dogma, not alone in substance, but also in formula, and still more the papal infallibility, preclude all possible doctrinal development in religion. Now religious knowledge, like every other form of knowledge, should be open and capable of perfection in interpreting doctrines of faith; and the same concept of revelation for whosoever looks upon history as a divine education of humanity does not exclude, but rather implies, a gradual progress. Whatever lives must develop and perfect itself; immutability means death; and if the doctrinal system of the Church is a living organism it must also submit to the general law of evolution. And this is necessary for the social equilibrium. Religion is the custodian of tradition and is tenacious of what Schiller, in Wallenstein, calls "the eternal yesterday"; while science and history woo the future of humanity. But as both powers are necessary to the economy of life, so science on the one hand profits by the continuity of the work which unites the present and the future with the past. On the other hand religion must seek in the past the germ of the future, and the strength of regeneration.

The Church must also learn that religious life should reflect in itself spiritual liberty, the essential form and condition of modern social life in all its manifestations. If it be true that where the spirit is, there is liberty, it is none the less true that where liberty exists there lives also the spirit. The institutional and confessional character of religion is what chiefly repels modern thought. In Italian society in which the individual is no longer a member of an organization or institution, but acts freely with the consciousness of his rights, no religion is possible but one that is founded on intellectual liberty and individual initiative. The Socialists also recognize religion as a personal and private matter, and that is certainly what it should be, a personal and intangible right. Again, if religion as a universal fact would have the value of a social function and for that reason be always represented by an institution, the secret of its strength and the pivot on which it must turn in the future must ever be liberty of individual conscience. It is only by reconciling the cure of souls and the inherent spiritual need of the Italian race with the profound and necessary exactions of modern civilization, that the Roman Catholic Church can exercise a beneficial social power according to the forms permitted by civil liberty and by the progress of human culture.

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18. EDUCATION IN ITALY. In the movement of modern culture, Italy has for many centuries maintained characteristics peculiar to herself. She forecasts and prophesies, but her work is restricted to the few and has not the power of assimilation to the masses; it is a nursery of budding genius, which brings forth few flowers or fruit in its garden. It is in Italy that new thought expands; that the

world of intellect is quickened. But this new thought which she has always produced she has never enjoyed. Humanism and the Renaissance began at a distance from Italy with the reformation of the practical energies of life; in Italy, literary culture, the Belles Lettres, were the possession of the few. The philosophic trend of thought introduced by the Renaissance put an end in Italy to mediæval mysticism, discovered new relations between nature and society, affirmed with Bruno the Infinity of Nature (*L'infinita natura*), and with Campanella *Il senso come sapere*. But elsewhere Spinoza, Schilling and Hegel explained the philosophy of immanence; and elsewhere Cartesio, Locke and Kant propounded the new theory of subjectivity. In Italy, Galileo introduced the new experimental philosophy; but it was elsewhere, with Bacon, that it became a system of logic and was generally diffused. It was in Italy, some years later, that Vico discovered many of the fundamental laws which govern society, but it was elsewhere that Vico's ideas were developed to their fullest extent. For many centuries the whole history of Italian culture is the history of initiative genius, but it is also the history of prodigious energies that were made of practical value elsewhere, and that exercised little or no influence in Italy.

What causes progress, what transforms and regenerates the education of a people comes from above, from its ideals; from its conscience, from its intellect and its culture; from the permeating of its social life and its activities with the modern ideas.

But all this could not come to pass in Italy. Here, even as regards education, we have ideas and movements for regeneration without the power to carry them out and make them general. Italy heralded the better part of Humanism, through Vittorino da Feltre; but the scholasticism inaugurated by him was of little benefit to the majority, and, besides, it was narrowed and spoiled by the meaningless verbalism of the Jesuits and the other monastic orders.

With the improved political conditions in Italy in the 18th century, and the new aspirations in regard to civil life, the educative idea gained bolder recognition among Italian men of letters and philosophers, particularly Genovesi and Filangieri; just as the effect of the French Revolution was felt at a distance, there were also signs in Italy of some new idea.

As Italy now found herself face to face with new educational needs, it was necessary that she should have the revolution of 1860, the true national rebirth.

The political revolution of 1860 required a great popular educational reform, in order to make the life of the new nation and the new government orderly, strong and secure. And such a reform was all the more urgently needed inasmuch as all knew that the revolution, which gave Italy its independence and made it a united kingdom, was the work of a cultured few; the effort and the aspiration of the best part of the *bourgeoisie*, who knew how to harmonize their ideas with those of the people.

The revolution of 1860 thus affected philosophic thought, the arts, literature; but it did not affect the conscience of the common people. Nevertheless, the revolution represented one of the greatest crises of history, inasmuch as it was to give new scope to the moral consciousness of Italy, and of the world, since it was not possible to overturn the papacy and reconstruct the nation as a unity without touching the deepest life of the Italian consciousness. There was, and is still going on, a moral conflict: the laic government, destined to develop on liberal lines, still finds itself in Italy in the midst of an ignorant and superstitious population. The formula of Cavour "A free Church in a free State," requires the education of the people on lines of moral, civil and political liberty in order to have concrete value or historical efficacy. There still exists a political conflict in the mind of the nation. For while the new state called the people to public life, they had been for centuries degraded and neglected, and were unprepared by special education to value either civil or political liberty. And this is the true reason for the apathy, the conflicts, the confusion and the anomalies of modern Italian life; and this is the true cause of the lack of good administration in Italian parliamentary life. How is it possible that political convictions should be formed; that there should be an interest in public affairs; purity and integrity in the exercise of electoral privileges, in a country where education is lacking in regard to the institutions by which that country is governed?

There is also a serious economic conflict in the life of the nation. Italy is fertile; she abounds in natural wealth, and has, moreover, an abundance of the best kind of wealth: soundness of moral fibre and genius. But this does not suffice. For it is not possible, amid the economic competition of the civilized world, that an uncultivated, uneducated people should produce as much as those nations that are cultured and educated; or that their products should bear comparison with those of their competitors.

We do not wish it to be understood that Italy of to-day has done nothing for the education of the masses. She has done something, but ought to do a great deal more. It is true that Italy had to face an enormous task, complex and arduous. She had to found the nation and reconstruct every part of her administration. She had to give an impulse to the puny economic life of the country. She had to supply all the urgent needs of defense. She had to modernize an entire people; to reorganize the culture of the higher and middle grade institutes, and with all this to reconstruct the scholastic and educational life of the masses, without any precedents in liberal thought, or educational institutions. Thus the task of the United Kingdom was more and more arduous, and necessarily so on account of the preponderance in every society of the material over the moral life; on account of the traditional custom that the ruling classes should first provide for their own welfare, instead of providing for the culture of the masses. For these and other reasons, the reform in the education of the masses could not be radical, complete, effective; and therefore it could not have the impetus, the coherence that it has elsewhere.

But if Italy has not done all that she should do, the example of other nations who have already achieved will incite the nation to do

better. But satisfactory progress is impossible unless the government take charge of the common school education, instead of leaving it to communal and local authorities.

In the last statistics, out of every 100 recruits an average of 40 were found to be illiterate. Nevertheless there is progress and even to-day there is a rich field of primary moral instruction in the various regions. In the social order the importance acquired by higher culture and common school necessitates a better education of infants and younger children. The deep moral crises which perturb the conscience of the masses make an early cultivation of the heart indispensable; and democratic life renders necessary the provision at an early age of an education of equality and of reciprocal respect. But these elementary institutions are not in proportion to the social needs.

And progress has also been made in the education of the people for professions. There is a form of professional instruction which makes part of popular education, for without it popular culture would not be effective, such as the learned professions, the arts or the trades necessary to all. Modern Italy in this respect has a legacy of institutions. There are industrial schools, art and trade schools, schools of applied art for industry and industrial design, professional and commercial schools for women, schools for viticulture and field courses in agriculture. But although there is progress even here, these schools are not adequate to the needs of the people. The alumni of these schools number only about 60,000.

When we think of the great popular educational revolution, which required the political revolution of 1860, we must acknowledge that what has already been done is insufficient for the needs of the masses. Italy as regards popular pedagogy is a nation without harmony and equilibrium between its political institutions, its obligations and the education of the masses. The agitation by the best element in the kingdom and by the Democratic party in Parliament shows that the nation feels the needs of a more intense and more comprehensive popular culture.

The progress of modern Italy in the so-called "middle schools" and in the universities and in the higher colleges has been very marked. After the beneficent law of Gianturco in the normal schools, these seminaries of the nation have acquired a great importance, both on account of the culture which they impart and also on account of the attention given to the preparation of future teachers. The lyceums and the technical institutes continue to improve their teaching force; the universities also grow from year to year in the number of students and improve in scholarship and science.

And here we must turn our attention to pedagogics.

Italian thought, philosophical, sociological and pedagogical, in the second half of the 18th century, owing to the political effects of the revolution, approximated more and more to the French thought. At the dawn of the century Realism (Sensismo) prevailed with Borelli, Soave, Gioia; and even our pedagogical learning under Cuoco, Delfico, Capecelatro and others felt the influence of French thought.

As the century advanced new life came into the thought and a new turn was given to pedagogy, and, as in Germany, France and England, so in Italy we find pedagogics and philosophy allied.

It was Pasquale Galluppi who showed Europe that there existed in Italy a new movement in philosophic thought; but it was the Romagnosi, the Rosmini and the Gioberti who made it evident to Italians through their researches in philosophy and pedagogy.

Romagnosi (1761–1835) represents the greatest and most extensive results in civic philosophy and civic education. In his work 'Dell' indole e dei fattori dell' Incivilimento' he gives a sociologic significance to education, considering it as one of the prime factors of civilization.

Romagnosi founded his pedagogical doctrines on social psychology, and not on the individual psychology and all the minute and subjected analyses of the philosophers of his day. According to Romagnosi the mind while yet in its individual formation passes through three distinct phases: that of *sensation*, of *imagination* and of *reason*. Romagnosi saw all the importance of spontaneity in the scholar, but he also knew when the mind should be permitted to function unaided and when it should be directed by human art. He desired that educational culture should unfold from the exterior domain of sensation to the inner man; he considered literary and scientific culture necessary in the scholastic field and thought that the state should take care of the education of the people. Romagnosi wrote argumentative treatises on education and was also interested in special pedagogic-scholastic questions. Cattanes followed in his footsteps, as did Ferrari, Giuseppe Sacchi and the famous writers of Crepuscolo, who from 1849 to 1859 reconstructed the consciousness of Lombardy. Romagnosi represents the laic professor of the universities in the Italian cities in the first half of the 19th century.

Even Antonio Rosmini Serbati, 1797 to 1855, did not dissever philosophy from pedagogical thought, but his mind had other motives, other scopes, other directions. 'Il Nuovo saggio sull' origine dele idee' (1835) lays the foundation of his whole system of philosophy, a system which he developed more fully in successive works, in which there are frequently considerations relating to education or dissertations bearing directly on the subject. While Rosmini inculcated an idealistic philosophy, which should be modern, catholic and patriotic, he represented the Neo-Guelphian idea,—the idea which was to reorganize Italy with the papacy. He left incompleted his work on higher pedagogy, 'Del principio supremo della Metodica.'

Rosmini had an interpreter of his ideas in pedagogics in Giambattista Antonio Rayneri.

The philosophy of Vincenzo Gioberti, 1801 to 1852, is this same idealistic philosophy—a catholic philosophy which seeks to regenerate catholicism. 'Il Primato morale e politico degli Italiani' (1843) and 'Il Gesuita Moderno' (1845) may be considered as veritable treatises on national pedagogy. But Gioberti in the course of politics and pedagogics, after the misfortunes of the war of 1848–49, reconstructed his political convictions and in 'Rinnovamento civile d'Italia' (1851) he prophesied a new Italy and the end of Guelphism. He had an interpreter of many of his doctrines pertain-

ing to scholastics in Vito Fornari. Meanwhile, it is remarkable that Gioberti and Rosmini, two philosophers who wished to found a Catholic philosophy, were both opposed and condemned by the Church. They both combated Pantheism and both were considered pantheistic by the Church. The Church condemned the patriotism of both. Among the great and liberal army of thinkers, of heroes and of martyrs of *La Giovane Italia,* Mazzini was a genius and a hero. He was not a philosopher in the sense of belonging to a school, or of being limited to a school of philosophy. He was the most exalted soul, mind and conscience, and most laborious patriot of Italy. Are not philosophy and pedagogy included in these words of his? "Without national education there exists morally no nation. The national conscience cannot be awakened except by its aid. Without national education, common to all citizens, the equality of civic duties and rights is an empty formula. The consciousness of duties; the possibility of rights of citizenship are left to chance or to the arbitrary choice of whoever may select the educator."

La Giovane Italia educated the nation more than all the treatises on pedagogy of the day; more than all the professors. It co-operated in Italy's political reorganization more than all the Neo-Guelphian initiatives.

Italy had, nevertheless, treatises on pedagogy in the years preceding the national reconstruction and these were written in order to hasten and prepare the way for this reconstruction.

Niccolò Tommaseo, a man of liberal, universal mind, in his work 'Dell' Educazione; osservazioni, saggi pratici,' published for the first time in 1826, had a wide conception of pedagogy. Tommaseo saw in education the root of all good. He felt the importance of the new methods and of schools for the masses.

Among the treatises on general pedagogy, we may consider the 'Pensieri sulla educazione,' by G. Capponi (1792–1875), published for the first time in 1845. In this treatise, small in bulk but full of ideas, Capponi considered under a new aspect the pedagogical reform, initiated by Rousseau's 'Emile,' and determined what there was of truth and value in it. Capponi combated educational superficialism, and pointed out the multiplicity of causes that might make the work of education effective.

Raffaele Lambruschini had a veritable worship for education, which he, like Capponi and Tommaseo, combined with a great love for Italy. His work as a pedagogist and educator was important, not alone in Tuscany, but in other parts of Italy. His 'Trattato dell' educazione' was published in 1850, together with his complete works, subsequent to the reconstruction of Italy.

Other treatises on pedagogy were published by Vitale Rossi di Spello (1782–1851) in his 'Manuale di scuola preparatoria'; by Luigi Alessandro Parravicini (1800–80) in his 'Manuale di pedagogia'; by Domenico Berti (1820–97) in his book 'Del metodo applicato all' insegnamento elementare,' published in 1849. But the most systematic and best arranged work on pedagogy is that of Giambattista Antonio Rayneri, 'Primi principi di metodica,' published in 1850. Rayneri (1810–67) was one of those who took the most prominent position in the diffusion of pedagogical culture among teachers, and it was not long before his books became almost a gospel for teachers.

Those who compared foreign treatises on pedagogy with our own found that our pedagogical culture was too local and not sufficiently universal; that Italy needed a psychological revival so as to be able to place the science of education on a broader foundation; that there was a predominance of theological-metaphysical ideas; that the lack of the spirit of political liberty restricted to a great extent the action of social ideas of any kind, and even of the pedagogical idea; that the lack of scholastic life made pedagogy almost entirely formalistic.

And in that first half of the 19th century, with its new pedagogical ideas, and its new scholastic movement, we must note the literary revival in the schools through the works of Giannetto; of Luigi Alessandro Parravicini; the many books of Cesare Canú, by Antonio of the 'Letture per fanciulli' by Lambruschini; of the 'Letture graduate' by Thouar; and of Fontana and by Vincenzo Troya. In all these new books for school reading there breathed a popular spirit, and it made one feel the need of harmonizing the school with the actual life of the people, and of adapting the life and teaching of the school to the life and thought of the masses.

The Institutions of Ferrante Aporti (1792–1857) brought into brotherhood men of various beliefs, and were also patriotic institutions. If these institutions were not new they at least derived benefit from the new Italian sentiment; and the asylums were co-operative in the nation's reconstruction, and made it evident to the masses that Italy would arise with new and higher ideals.

Pedagogical literature was also represented by women in Italy at this period by Caterina Franceschi Ferrucci (1803–67), whose chief work was entitled 'L'educazione morale della donna italiana.' Her work was highly praised, as it deserved to be. Giulia Molino-Colombini (1812–79) also wrote on pedagogy, and her work is entitled, 'Sulla educazione della donna.'

But after 1860, when the greater part of Italy became unified, there arose a new life, the life of the nation; and with the new life of the nation, a new philosophy, a new pedagogy.

The philosophy which before the revolution had been mainly Neo-Guelphian, now became wider in its scope, more Hegelian through the work of Ansonio Franchi Giuseppi; more positive in the writings of Andrea Angivari. The older schools continued, it is true, on the same lines, but the new life in the thought of the day made itself felt by emphasizing the need of forsaking old traditions and placing the higher Italian intelligence on a par with the rest of the world; the need of making philosophy a free interpretation of the mind; the need of making the reconstruction of Italian speculative thought correspond to the reconstruction of the whole Italian life. Whilst before the revolution, philosophy and pedagogy were strongly tinctured with Church doctrines, though perhaps ignorantly, there now arose a

philosophy independent of all religious beliefs, a philosophy which sought nothing but the truth and the interests of humanity.

But even after the revolution pedagogical teaching allied itself closely to philosophical doctrines. Fusco, Siciliani, Angiulli, Latino, Gabelli and Veniali were very prominent in the pedagogy of the day. Eduardo Fusco (1824–72), professor of anthropology and pedagogy in the University of Naples, in his lectures, edited by his wife after his death, gives evidence of a high and varied degree of culture, and profoundly liberal sentiments. He had a profound belief in education for refashioning Italian life and consciousness. Pietro Siciliani (1835–85) combined more broadly than Fusco philosophic speculation with pedagogics. He sought in philosophy a certain *middle way*, which should merge into an eclecticism influenced by the positivist traditions of Galileo and Vico. He became, in fact, after his manner a solitary positivist. He wrote a great many works on philosophy. His pedagogical works were the 'Storia critica delle teorie pedagogiche in relazione colle scienze sociali'; 'La Scienza nell' educazione secondo i principi della sociologia moderna.' His writings on pedagogy had a great influence on teachers.

Andrea Angiulli (1837–90) was constantly occupied with the thought of a regeneration of philosophy and pedagogy. Three of his works are 'La filosofia alla ricerca positiva'; 'La pedagogia, lo Stato e la famiglia'; 'La filosofia e la scuola.' These works are an honor to Italy. In no country has there been a higher conception of pedagogy than that of Angiulli. He was a great student of scientific philosophy and maintained his independence of thought in opposition to the greatest thinkers of the age. To all that he wrote, Angiulli gave the imprint of his personality and even the things said by others acquired a new value when spoken by him.

Emanuele Latino (1845–90) wrote 'Il lavoro manuale e il problema educativo'; 'Della pedagogia nelle sue armonie ed antinomie,' etc. Latino had not the philosophic and universal mind of Siciliani and Angiulli. He dealt with the most prominent questions of pedagogy, but he treated them from a critical scientific standpoint.

Aristida Gabelli (1830–91) was the author of 'L'uomo e le scienze morali'; 'Il metodo di insegnamento'; 'L'Istruzione della donna in Italia'; 'Pensieri'; 'L'Istruzione in Italia'; 'Il mio e il tuo'; 'La nuova scuola di diritto penale in Italia'; 'Gli scettici.' Gabelli had a great insight in regard to schools and promoted the regeneration of their methods. His work, 'Il metodo di insegnamento,' had a great share in the regeneration of the Italian schools. Whilst among the teachers of the period preceding 1860 the Pestalozzian reform reached in through the interpretation of Girard, with Gabelli the system of Pestalozzi entered the schools stripped of all unimportant elements, and in its living and vigorous substance.

The teachers of this system, the schools and the scope of pedagogics were very effectively influenced by Francesco Veniali. The questions in regard to the importance of the common school, and the social standing of the teachers in new Italy was considered by him. By him, also, the new didactic method was discussed in a practical manner; and he was the first to lay bare the defects in the existing school administration, which left the common schools to the commune, upholding, according to Italian tradition, the direct action of the government. Francesco Veniali had the affection and esteem of all the educators of his day. It was he who placed the various systems on a practical basis; it was he who promoted the improvement in normal schools and who contributed very largely to the higher culture of teachers.

Italy boasts to-day living pedagogists of great ability who honor her. We may cite Allievo, Cololla, Credaro, Fornelli and Sergi.

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19. ITALIAN SCHOOLS AND UNIVERSITIES. Public instruction in the kingdom of Italy is essentially of three grades: (1) Primary and popular; (2) intermediate and secondary; (3) high school grade.

1. Primary and Popular Instruction.—Primary instruction is given, in general, in the elementary schools, and the course, under the care of men and women teachers under the direct superintendence of school inspectors and directors of instruction, lasts five, or even six, years, under government control which determines the syllabus, the examinations and every other modus operandi. The elementary schools are supported by the communes.

Compulsory elementary instruction, prescribed by the law of 15 July 1877, No. 3961, for all those who were not under private instruction, was through a later law extended to the 12th year of age; this is restricted to the primary elementary course (the first three years) in those communes where the compulsory higher elementary course is lacking, and in other communes is extended to all the compulsory classes of the high schools that may exist there.

The subsidiary branches of the elementary schools are: the *Patronali;* the *Educatori* and the *Recreatori*, the kindergartens, and the professional schools, all of which are very little under legislative control or regulation. The government, for the most part, does little but exercise the right of supervision of institutions founded by local enterprise, or by the bequests of private citizens. The kindergartens, for instance, have for the most part been established by public or private beneficence; hence, as works of charity they are dependent, to a certain extent, on the Ministry of the Interior. These kindergartens number more than 2,000 public institutions, with 140,000 boys and 132,000 girls; and more than 1,300 private institutions with 42,000 boys and 43,000 girls.

A new institution of a free popular school lately established in Italy through private initiative is the People's University, the scope of which is to diffuse scientific, literary and artistic culture among the people. The new people's universities date from 1900. That of Turin, which may be called the original one, gave the keynote to what was to be the Italian type of the institution, having as its scope: (1) To popularize the most reliable conclusions of science, making them accessible to those who had

not received a special scholastic training; (2) to impart in a simple and lucid manner instruction in the literature and history of the arts, with a view of accustoming the students to the conception of the noblest ideals of life. Rome and Bologna took up this movement almost contemporaneously. There are in upper Italy about four of these institutions in Piedmont and Liguria, seven in Lombardy, five in Venetia, eight in Emilia, one in Rome, one in Naples, three in the rest of southern Italy, three in Sicily; and many others are being established in various parts of Italy. They are also to be found beyond its confines.

2. Intermediate or Second-grade Instruction.— Intermediate or second-grade instruction is of three kinds: Classical; technical; normal, or pedagogical.

Classical instruction is carried on for five years in the gymnasium, and for three years in the lyceum and comprises the following subjects: In the gymnasium, Italian, Latin, Greek, French, history and geography, descriptive geography, mathematics, natural history, gymnastics; in the lyceum, Italian, Latin, Greek, history and historical geography, philosophy, mathematics, natural history, physics and chemistry, gymnastics.

Technical instruction is imparted: (a) In the technical schools; (b) in the technical institutes; (c) in the nautical institutes.

(a) The technical schools aim to give technical instruction of the highest grade; that is, to complete and extend the knowledge acquired in the elementary schools in such a manner that the students may succeed either in conducting a business or in minor administrative offices, and may be enabled to pass the examination for admission to the first class of the Technical Institute. The years of study are three and cover 10 branches of study: Italian language, French language, Italian history, geography, instruction on the duties and rights of citizens, elementary mathematics, instruction in the natural sciences, accounting, designing, caligraphy. Training is added in gymnastics.

(b) The technical institutes have as their scope to impart technical instruction of the second grade, that is, to furnish the instruction necessary to prepare the student for higher studies, to qualify him for certain professions and for positions in the government, in industry, commerce and agriculture. The course of study is, therefore, divided into several sections: a physico-mathematical course; surveying; a commercial and bookkeeping course; a course in agriculture; an industrial course. Each of these is adapted to some special end, and for that reason differs from the rest in the character of the instructions imparted. The course of study in each branch lasts four years.

(c) The nautical institutes have as their object to give intermediate technical instruction to those who intend to dedicate their lives to navigation and maritime arts and industry. The nautical institutes include three branches: one for captains; another, machinists; and another for shipbuilding. Each branch comprises two courses: one of two years for sea-captains on larger coasting vessels; one for machinists and for naval construction of the second grade; another of three years for deep-sea captains, for high grade machinists and for naval construction of the highest grade. A preparatory course of two years, to which the elementary school certificate gives admission, precedes each of these courses.

Normal, or pedagogic instruction is imparted in the normal boys' schools, and in the normal and complementary girls' schools. Of the former, 29 are under government control; of the latter, 78 are government schools. The normal boys' and girls' schools are of two grades, elementary and high school. In the lower grade the studies are with a view to obtaining the certificate of teacher of the first three elementary classes; in the higher grade the studies are carried on with a view to obtaining a certificate as teacher of all of the five or six classes, and in the female department also a certificate as teacher or directress of a kindergarten. The course lasts three years for each grade. The complementary school course is also three years for each grade.

Other institutions of minor importance under government control are (a) the Convitti Nazionali, the aim of which is to give to young boys a moral, intellectual and physical education to make them worthy citizens. There are 43 such schools for boys, with over 4,000 boarders; (b) female institutes or female asylums. These may be divided into three categories: (1) Shelters to provide temporary assistance for poor children, orphans, deserted children, etc.; (2) institutions for young girls of refined and wealthy families; (3) misti (mixed schools) which partake to a certain extent of the nature of both.

3. Higher Instruction.— *Universities.* Higher instruction is imparted in the universities properly so-called, and in other special institutes resembling the universities in the character of their instruction. The Italian university consists fundamentally of the faculty. The faculty comprises four chairs: Jurisprudence; medicine and surgery; science—physics, mathematics and natural sciences; literature and philosophy. Certain schools may form an integral part of the university, or be annexed to it, as the following: Applied engineering; agriculture; pharmacy; veterinary medicine; obstetrics. See STATISTICAL SUMMARY.

The scholastic year begins in the universities on 16 October and ends on 31 July. Each university publishes an 'Annual,' in which, in addition to the list of names of professors and students, statistics, calendar and hours of study, there are printed the inaugural discourse of the academic year, and a catalogue of the works published during the year by the professors and assistant professors.

The government of the university with its varying duties, always under the supervision of the Minister of the Interior, is in the hands of the following authorities: (1) The rector; (2) the academic council; (3) the presidents of faculties and directors of schools; (4) the council of the faculty; (5) the general assembly of the professors.

There are three distinct classes of instructors: (1) Official instructors (in ordinary and extraordinary); (2) teachers in charge; (3) unattached, or private teachers.

In conformity with the law of 12 June 1904,

No. 253, the appointment of professors in ordinary and extraordinary is, with two unimportant exceptions, by competitive examination.

The appointment of those professors who give instruction in certain higher branches is only for one scholastic year, but may be renewed.

The official teachers (in ordinary or extraordinary) may hold private or outside classes; also the associate doctors and those who have qualified as unattached teachers.

The official instructional courses are public, except the practical exercises and the experimental demonstrations which the teachers may limit to those who are enrolled in their courses.

A distinction is made between students and those who attend the lectures (*uditori*). The students, at the close of their studies, have the privilege of obtaining the academic degrees, conferred by the faculty or school to which they belong; the studies pursued by the *uditori*, on the other hand, are of no value in obtaining an academic degree. In order to matriculate, students must have obtained the diploma of graduation granted by a lyceum, or some other equally valuable certificate according to the general regulations, or the special regulations of the faculty or school, concerning admission to the various courses of study. Under specific conditions laid down by Art. 12 of the General Regulations, both foreigners and Italians may matriculate, or continue their studies in the Italian universities, even though not natives or sons of Italian citizens, having or having had their usual domicile in foreign countries.

In the various faculties, or schools, there are held special examinations and examinations for certificates, for bachelor's degrees, and for diplomas according to the special regulations. The special examinations and the examinations for certificates are held in two sessions; the first begins on 16 June; the second on 16 October. The examinations for the degree of bachelor and for diplomas are held during the scholastic year at certain times appointed by the Council of the Faculty. All the examinations are public.

Every scholastic year a competition is opened between the young bachelors of the various universities and the institutes for higher instruction dependent on the Ministry of Public Instruction for a sum of money (scholarship) intended to place them in a position to perfect themselves in their studies at a national or foreign university, or to undertake a course of travel for the sake of study.

The entire course in the faculty of medicine and surgery is completed in six years, whereas the complete course of study lasts only four years in the faculties of jurisprudence, of physical sciences and of philosophy and literature.

Schools of Teachers.— To the faculties of philosophy and *belles-lettres*, physical science, and of mathematical and natural science are annexed schools of teachers, whose object is to perfect the alumni in the art of teaching philosophic, literary and scientific discipline in the lyceums, in the gymnasiums, in the technical and normal schools and in the technical institutes. These are presided over by a director nominated by the Ministry for three years. The lectures they hold are private. The school of teachers annexed to the faculty of philosophy and *belles-lettres* includes four departments, and requires a two-year attendance of each student who is enrolled in it.

Royal Normal High School of Pisa.— The Royal High School of Pisa deserves particular mention whether it be on account of its special discipline, or on account of its importance. "Its object is to prepare and equip for the position of professor or teacher of intermediate schools." It was established in Pisa by the Grand Duke, 28 Nov. 1846; or, to speak more correctly, re-established. For already at the end of 1813, by a Napoleonic decree (29 January) there was established in this city an ancillary of that Normal School of Paris which was rebuilt by the same Napoleonic government in 1808 on the site of the ancient French Normal School, founded in 1795 under the supervision of the Convention. The government of the school is entrusted to a council of managers presided over by the rector of the University of Pisa. The director of the school is chosen by the Minister of Instruction from among the professors in ordinary of the faculty of philosophy and *belles-lettres* and from that of mathematics, physics and natural science of the same university.

Schools of Pedagogics.— By a royal decree of 1 Feb. 1906, there was established near the Royal University of the Kingdom (in the faculty of *belles-lettres* and philosophy) a course of higher studies (in proficiency) for the licentiates (graduates) of the normal schools with the view of preparing them for the position of school inspector and school principal. The course covers two years, but may be completed in one year by anyone who, in addition to the requirements of the enrolment has also obtained a bachelor's degree or a diploma in Italian literature, history, pedagogics, conferred by the royal higher female institutes in Rome and Florence.

University Institutes.— There may be named in this category: (a) The Royal Institute in Florence for higher practical study and proficiency. This comprises three departments: (1) Philosophy and philology; (2) medicine and surgery; (3) physical and natural science, and two schools, a school of pharmacy and a school of obstetrics. The administrative government of the institute is entrusted to a council of managers consisting of five members, two of whom represent the municipality of Florence and three the royal government; and the department of instruction to an academic council composed of five members — the president of the council of managers, the presidents of the three departments, and the director of the school of pharmacy.

(b) The Royal Scientific-Literary Academy of Milan. This has a university faculty of philosophy and literature. By a royal decree of 18 Aug. 1880, there was added to the school of teachers annexed to this academy a department for qualifying students to teach modern languages and literature in the intermediate schools of the kingdom, to which are also admitted students who are not enrolled in the branches of philosophy and literature.

(c) The Royal Higher Institute of Technology of Milan. The obligations and government of this institute, maintained by the state with the aid of the province and commune of Milan, are determined by the royal decrees of

13 Nov. 1862, 5 March 1863, 3 Sept. 1865, 5 Nov. 1875, 24 Jan. 1897. The institute comprises eight departments. The course in the preparatory school covers two years; that in the special schools, three years, and that in the normal department, four years.

(d) The Royal Polytechnic High School of Naples. This school was established by royal decree of 30 July 1863, which at the same time abolished the pre-existing school of hydraulic and field engineering. It comprises courses in civil engineering, mechanical engineering and architecture; and in addition a special course in electro-technics, and a course in hygiene as applied to engineering. Each course covers three years.

(e) The royal schools of applied engineering (not dependent on their respective universities) of Bologna, Rome and Turin.

(f) The Royal Naval High School of Genoa (hitherto dependent on the Ministry of Marine).

(g) The royal schools of veterinary medicine of Milan, of Naples and of Turin.

Institutes and Special Schools.—(a) The royal higher institutes for female instructors in Florence and Rome. These were founded by the law of 25 June 1882, and their object is to provide for and to augment the literary and scientific culture of women, on the one hand, and on the other, to qualify them as teachers and instructors of special branches in the female normal schools, in schools of the highest grade, and in all the other intermediate girls' schools throughout the kingdom. The course covers four years.

(b) The university schools annexed to the lyceum gymnasiums of Aquila, Bari and Catanzaro.

(c) The Royal Institute of Social Science "Cesare Alfieri" in Florence with the annexed provincial school for notaries. The course covers three years.

(d) The royal schools of theoretical and practical obstetrics of Milan, Novara, Venice and Vercelli.

(e) The Royal Oriental Institute of Naples. Here they have courses in Hindoostani, Arabic, Amaric, Turkish, Modern Greek, Albanian, Chinese, Japanese; in the geography, religion, legislation of Oriental nations, and their commercial relations with Italy; and complementary instruction in English and Russian.

(f) The Business University Luigi Bocconi of Milan. This was founded at the pious suggestion of the Milanese merchant, Ferdinand Bocconi, the elder, in honor of the memory of his son, Luigi, who lost his life in the disastrous battle of Adua.

(g) The institutes of fine arts (maintained by the government) at Bologna, Carrara, Florence, Lucca, Massa, Milan, Modena, Naples, Palermo, Parma, Rome, Turin and Venice; and those not supported by the government, at Bergamo, Ferrara, Genoa, Novara, Pavia, Perugia, Piacenza, Pietrosanta, Ravenna, Tiena, Urbino, Vercelli and Verona.

(h) The musical institutes and conservatories, under government control, of Florence, Milan, Naples, Palermo and Parma; and those not supported by the government, of Bologna, Pesaro, Rome, Turin and Venice.

(i) There are some higher institutes dependent on the Ministry of Agriculture, Industry and Commerce, such as: (1) the three commercial high schools of Bari, Genoa and Venice; (2) the two high schools of agriculture of Milan and Portici; (3) the higher Agrarian experimental institute of Perugia; (4) the institute of forestry of Vallombrosa.

Military Institutes.—Those dependent on the Ministry of War are (1) the War School of Turin; (2) the Military Academy of Turin; (3) the School of Artillery and Applied Engineering of Turin; (4) the Military School of Modena; (5) the School of Applied Military Hygiene of Florence; (6) the Military Colleges of Naples and Rome; (7) the Central School of Infantry in Parma; (8) the Cavalry School of Pinerole; (9) the Central School of Artillery on the Poligono del Nettuno near Rome; (10) the Military School of Instruction in the Use of Arms, in Rome. Those dependent on the Ministry of Marine are: (1) the Naval Academy of Leghorn; (2) the School for Apprentice-machinists in Venice.

Statistical Summary.—The 'Report of the Commissioner of Education, Department of the Interior, Bureau of Education' (Washington 1915, pp. 711–717) includes the following statistics of education in Italy: The number of pupils in infant schools in 1907–08 was 343,563 and 34,900 in orphan asylums; in elementary public schools 3,002,168 and elementary private schools 148,081; in evening and holiday schools (new style) 182,373 enrolled and 127,948 in constant attendance. In 1911–12 the number of pupils (including auditors) attending normal schools was 20,961 (boys 3,727 and girls 17,234); in complementary (girl's) schools, 24,254; in "gimnasi," 48,406; in licei, 15,867; in technical schools, 94,031; in technical institutes, 22,181; in nautical institutes, 1,730. In 1912–13 the number of students in special and practical schools of agriculture was 1,716; in mining schools, 59; in industrial schools, 50,550; in institutes of fine arts, 4,362; in institutes of music, 5,569. The universities and university schools annexed to royal licei were given as 24 in number, with 23,376 students; the university institutes, schools of higher education for women, and special higher institutes, 28 in number, had 7,251 students. Military schools (12) had 3,630 students or cadets; the four naval schools, as a total, 586. Organized efforts were made in 1915 to attract "more foreign students" to Italian universities or other institutions of the higher learning. Other items in the education report, 1915 (above cited), of special interest to American readers, are the following: "Moving pictures are now coming to be used in Italy for educational purposes. A moving-picture establishment (for such uses) was opened last November in Rome in the 'Calidarium' of the Thermal Baths of Diocletian under the auspices of the national institute 'Minerva.' Again, "Between 1872 and 1911 (statistics from Annuario statistico italiano for 1913, the latest published, issued by Direzione Generale della Statistica e del Lavoro) illiteracy was reduced from 68.8 per cent to 37.6 per cent. Recent advices indicate that the decline in illiteracy in Italy has been accelerated, but no statistics are available."

VITTORIO PUNTONI,
Rector of the Royal University of Bologna.

20. THE EDUCATION AND SOCIAL STATUS OF WOMEN IN ITALY. One of the most remarkable features of progress in Italy is the advance made in the education of women since 1880. In former centuries there were highly cultivated women, some distinguished as writers or artists, especially as musicians and actresses, but in modern times until 1860 the great majority of Italian women seemed condemned to ignorance, especially in the southern provinces. Women were not even taught to read and write; married or single, they were expected to take a subordinate position in their own families and in society. The ancient Roman law was observed, which made the man the absolute master of the household, the *pater-familias,* whom even adult children obeyed as their supreme head. To-day education is compulsory and elementary education is given free to all children of all classes and of both sexes; the expenses are borne by the local authorities, assisted by the national government, which exercises a general supervision over elementary culture. Elementary education is also imparted in private schools, authorized by the government, and these are under the direction of lay or clerical teachers duly qualified.

Educational institutions for women are divided into colleges and day schools; some of these are supported by the communes, some by the government. Girls can pass from elementary to normal schools, these being usually the highest grade passed by women. This enables them, like men, to obtain positions as teachers in elementary schools. Women, however, have an advantage over men, as after their normal degree, they may enter for four years' higher training in the Institutes of Superior Studies, where in addition to advanced literature, they are trained in several branches of science and in foreign languages, French being compulsory and a part of the program, and either German or English, according to choice. The degree taken in these Superior Institutes enables the young women to teach in the normal and technical schools. Education may be either technical and commercial or classical. Women are admitted to all educational institutes and can follow the same courses of study as men; they may take a university degree, and may profess and practice medicine, chemistry, arts and philosophy, but a legal career is not yet open to women, even when duly qualified. In the early eighties of the last century, the first student in law, Lydia Poet, obtained her degree, but was forbidden to make use of it. The Tribunals, which are a part of the Government Department of Justice, objected to women-pleaders; hence legal training is of use only in a lawyer's office, not in courts of justice. Later a woman-lawyer, Teresa Labriola, obtained permission to lecture in the University of Rome, where another learned and brilliant woman, Maria Montessori, M.D. (q.v.), had a chair of anthropology (1900–07). In the University of Naples, Professor Ogliarolo was helped in his work and teaching of chemistry by his wife.

Technical, commercial and professional schools prepare girls either for teaching in such departments or for becoming bookkeepers, cashiers, dressmakers, laceworkers, etc. It was at last recognized that woman should undertake her share of work and contribute to the support of herself and her family. In Italy the woman question is much nearer solution on the economic than on the moral side; it is not usual to prepare for a profession a girl, who has or will have private means sufficient to relieve her from the necessity for work; hence woman's education is not the same for all classes of society. Young girls of aristocracy of birth or wealth leave the convents or colleges where they have been educated with a fair equipment of general information; many of them acquire an equivalent education at home by private tuition; but such an education being uncontrolled by any sort of examination, and conferring no degree, does not enable its recipients to follow any career, should she some day need to work.

The Institutes of Fine Arts have also been thrown open to women since 1890 and many girls take their degree as teachers of drawing; a few become painters or sculptors; many more work in the field of decorative art. The industrial arts have made much progress of late in Italy; there are three excellent Industrial Museums, the one in Naples being renowned for its important production of delft-ware. But where women excel to-day in such industries is lacework. It was around 1886 that a Venetian Countess, Adriana Zon Marcello, a lady of honor to Queen Margherita, conceived the idea of reviving the lost art of lacemaking, for which Italy had once been so famous. Encouraged by the Queen, the work was revived, at first in Venice, and so much interested the Italian ladies of the upper classes that the production of all kinds of hand-made laces and embroideries has been established in different provinces, reviving in each the special characteristic designs. A few years since the ladies conducting the work established an incorporated Association of Italian Feminine Industries, having its headquarters in Rome. The work exhibited is of exquisite character. Literature and journalism offer a large field of labor to women, but these professions are scantily remunerated in Italy.

No one who has not lived in Italy during recent years can realize the wonderful advance made in every department of woman's life. Women's associations have been started, women's papers circulate, women work in new fields of labor, they are fully recognized as able to take care of themselves and their industrial co-operation during the Great War 1914–18, is regraded as having greatly advanced the solution of their economic position. This advance, fostered by uplifting influences, is notable in Rome where it seemed well-nigh impossible that modern ideas could ever take root.

When Lady Aberdeen was president of the International Council of Women in 1898, she asked Mrs. Sanford, who was then coming from Canada to Italy, to invite Italian women to the great International Congress which was to be held in London in 1899. Mrs. Julia Ward Howe, who was then in Rome, greatly helped Mrs. Sanford in her mission. A meeting was held in Rome in 1898 and the Italian ladies present were deeply touched by the interest in Italy evinced by American women. They promised to draw up a program that (adapted to the circumstances, habits and needs of their country) should make it possible to do some-

thing practical towards starting a National Council of Women in Italy. It was decided to federate in one large association the principal co-operative societies of woman's activity; and the aims of the General Federation of Woman's Work were defined as follows To create a current of mutual understanding and kind feeling amongst women interested in this or other good works; to make widely known the various existing enterprises of women; to bring about, by the force and influence of the union of women's associations, the most desirable reforms.

Since the congress in London, the first program has been greatly enlarged, but it contained the central idea, around which the delegates of different associations grouped themselves. Countess Lavinia Taverna, a lady of honor of H. M. Queen Margherita, was unanimously named president and received the valuable help of Miss Dora Melegari, who was the first general secretary of the federation; one of the strongest of modern writers and a woman of very superior character.

When 60 different organizations, created and supported by women, had joined the Roman Federation, it was decided to begin with them a National Council of Women. Three years after the first Federation of Woman's Work was organized there were 60 different institutions, whilst in the same number of years American women organized only 11.

Italian women carry their aspirations further than philanthropic schemes; they aim at a social activity in the fullest meaning of the word, but avoid every sort of political action. They study the condition of woman, comparing it with her condition in other countries, taking into account the rare virtues of Italian women, virtues that often, by the force of circumstances, reveal themselves in silent self-sacrifice more than in positive and efficient action. They acknowledge that woman in Italy has in all social spheres much to learn economically, morally, intellectually. The Italian woman is only now beginning to recognize and develop her moral sense and her social personality, and every effort is made to further this aim. By lectures, many of which treat of the different aspects of the woman question,—her culture, her social, judicial and even political rights,—through books, papers, reviews (such as *Vita* Femminile, started in Rome in 1907), Italian women are led to recognize that a high standard of social duties is necessary.

The majority of women do not believe that their active co-operation can be of any use in politics and are not desirous of the right to vote, for they know well how efficacious their indirect action can be, through their influence over the men of their own family and their friends. The influence of woman in the family is so strong in Italy, that the women question in Italy is of the utmost importance and has to be solved in a manner essentially different from that of other countries. The Italian woman understands that she cannot and must not remain inactive in the fervor of the moral resurrection of her country, and if at times she seems inert and uninterested, it is because she works in silence, without pomp or parade.

It may be safely asserted that the educated Italian woman is inferior to none. She differs only in temperament and its manifestations in daily life. Averse to participation in public affairs, she is yet an important factor in them owing to her personal influence, and there is no doubt that woman in Italy is becoming an important social power. Freed from many prejudices and misconceptions which have kept her far from the vital interests of the nation, she is advancing in the full promise of a brilliant future.

COUNTESS FANNY ZAMPINI SALAZER,
Professor of English in the Royal Institute of Higher Learning for Women in Rome.

21. ITALIAN LANGUAGE. I. The Literary Language.—The Italian literary language has for a foundation the Florentine dialect, with which, more than with any other, it has in common not alone phonetics and morphology, but also syntax and vocabulary. In regard to its phonetics, which in this matter is of the greatest importance, it will be enough to say that Siena, which has had a certain desire to dispute the first place with Florence, has, as characteristics of its dialect, the examples,—*conseglio, gionto, cavallaria,* etc., which resemble the other Italian dialects and remove it from the Florentine (and literary) types:—*consiglio, giunto, cavalleria.*

It was proper (because of Dante, and also of Boccaccio and of Petrarch) that the Florentine dialect should become the language of Italy; and of these three great names, Petrarch deserves a place quite by himself, because the language of his 'Canzoniere' ('Book of Songs') is generally much less idiomatic, and hence more largely Italian.

The literary tongue of Italy is founded, then, upon that Florentine dialect, a trifle archaic, of the 14th century, and has changed but little, partly from the respect for tradition, but more because the Florentine himself has not changed. The language of Dante is, without any serious differences, the language of today: there is no such thing as old-fashioned Italian and modern Italian.

Italian literature was the last to emerge among all the great Romance literatures, and its cradle was not in Tuscany. The cause for this tardiness can be found in part in the greater attachment which the Italians had for Latin. But probably certain negative conditions had more importance, namely, that in Italy there had not survived political and social conditions necessary for the development of the poetry of the laymen, or popular epic poetry. At all events, the language of the first school of poetry, of the time of Frederick II, which contains the southern elements and also to a certain extent the language of the later schools, of Arezzo and Bologna, left also evident traces in the language of the Florentine school of the *dolce stil nuovo* (soft new style), which quickly seized the sceptre of poetry, and these traces, although they are hardly discernible, have never entirely disappeared from our own poetic tongue.

The first document in that dialect, which from about 1290 down predominated in Italian arts, appeared in 1211, and naturally is not at all a literary document, being «Fragments of a Book of Florentine Bankers.» But after Dante, the Florentine had no serious adversaries. The linguistic unification proceeded slowly at first, so that Ariosto, not only after Boccaccio and Petrarch, but also after Poliziano and Pulci, by

following in the steps of Boiardo, was able to write 'Orlando Furioso' in a hybrid tongue, which, though seeking to be purely Italian, yet preserved phonetically and morphologically a great many Emilian elements.

However, now arrived the time when it acquired its rich vocabulary, its clarity, and so to speak, its theory, and when the language of the people (as used by Dante, by Boccaccio and by Petrarch) should become the new language of Italy, capable and worthy of a grammatical system as regular and as rigid as Latin. These three great Tuscan poets are Italian classics and are accessible to all Italians. And a kind of grammar of the popular tongue, founded upon their example, is the 'Prose' by Bembo in 1525. Ariosto, following the movement, changed the 'Orlando' written in the dialect of Emilia in the editions of 1516 and 1521, into the 'Orlando' of 1532, which was written in the Tuscan dialect and above all tried to be grammatically correct. The period of hybridism was finished, although some traces of it, not only morphologically, but also phonetically (*fameglia, gionto per giunto,* etc.), are continually found in writers who were not Florentines, and above all not Tuscans, during the whole of the 16th and also the 17th centuries.

It was then a question of vocabulary and particularly of style, and has so continued until our time. In discussing the name to be given to the language, whether Florentine, Tuscan or Italian, etc., the earliest 16th century writers naturally did not distinguish in a particularly clear manner between phonetic hybridism and the rest; neither the Senesi, who, against the exclusiveness of the Florentines, defended the customs of the whole of Tuscany and especially of Siena (and this continued rather late, even to the time of Girolamo Gigli, a writer of the 17th or the 18th century), nor Giorgio Trissino of Vicenza who desired to do his share in everything Italian. In the beginning of the 19th century, as a reaction against the ultra simple and colorless language of the 18th century, there arose a most strict school of the purest 14th century — a revival, which, although it was contested by Monti and by others in the name of a greater breadth and modernity in the choice of models, yet, having some merit, it helped to strengthen the weak and artificial academic quality of Italian prose.

Alessandro Manzoni, in his 'Promessi Sposi,' first issued in 1827, succeeded partially in restoring the model set by Ariosto; but so much the more for Manzoni was it a question not of phonetics but of style, and of vocabulary so far as it is necessarily connected with style. In place of a language which had become too literary, he wished to substitute a language which, like the French, should be fresh, natural, precise. Thus he became the most enthusiastic and convincing, and altogether the most logical and coherent of the advocates of living usage and consequently of Florentine speech. He thought that all the Italians, in order to possess a language not only alive and copious but free to all and by all equally understood, no matter how delicate or slight the meaning, and in all its more specialized usage — just as the French have done — should follow the usage of cultivated persons of Florence. Thus there came, before all, a renewal of the vocabulary; but following on this were added naturally some phonetic modifications, such as the substitution of *o*, which to-day the Tuscans pronounce, for *uo*, an archaic survival from the literary language. From this resulted (due to the work of the followers of Manzoni) a frenzy, so to speak, of Florentinism. But of all the noise made about it, there remains to-day only an echo in some recent books. Without any doubt, through his work and his example, even more than by his theories, Manzoni has assisted tremendously in reviving and infusing with new blood the ancient tongue, or — to speak more accurately — the ancient academic Italian prose; although it may be that their traditions have not entirely disappeared, and that the vocabulary of the members of the Florentine Academy of Letters (the Crusca) is too loyal to these traditions. And no one can doubt for a moment that he who wishes to speak or write well should pass a longer or shorter period at Florence or at least in Tuscany, because the language used in Italian conversation, being meagre or inexact in almost all the provinces, it happens frequently that even cultured people lack the habit of thinking with energetic spontaneity in Italian, whatever may be the subject of their thought. On the contrary, it is well understood to-day that a language is not renovated by those mnemonic exercises which were so dear to the followers of Manzoni, but only by copying and following beautiful and powerful examples. An entire nation, which lives in the present, can never entirely forget its past; and the unification of the language cannot be brought about by artificial means but only by the progressive and ever ascending blending of Italian spirit and Italian culture.

From the standpoint of philology, Italian is one of the Romance languages, which are a continuation of the Latin, of which they are, so to speak, the present phases; and, for certain qualities, for example, the loss of the final *s*, it could unite itself with the Rumano-Dalmatic dialects (or the Roman language of Dalmatia that has almost entirely disappeared), forming an Eastern group to oppose the Western group, composed of Ladin, French and Spanish.

Literary Italian, which belongs to central Italy, is one of the Romance tongues which has preserved more abundantly and with fewer alterations the traits of the Latin as regards phonetics and the dictionary. One or another of the sister languages may have some partial advantage over this one; for example, the tongue of Sardinia, opposed not only to Italian but to all the dialects derived from the Roman, has preserved in its Tonic vowels a phase of Latin vocalism more archaic, we might say the phase of the time of the republic, as opposed to that of the empire; and the preservation of the final *a*, which set to the French and to the Provençal the fashion of preserving more at length the traces of the Latin declension. But this and other similar observations cannot change appreciably the result of judgment as a whole; it must be remembered that Italian has preserved faithfully almost all the internal consonants, so that it can present an almost unchanged series such as *amate, amatis, mutare, credo, vidi, fedele, ripa, nipote, amico,* and (as opposed for instance to *segare*), *legare.* For the rest, the dropping of the final *s*, which undoubtedly once had a place in Latin vulgate, is not of special importance except as a part

of a general phenomenon, i.e., the loss of all the final consonants; and this phenomenon, combined with the preservation of all the final vowels (to say nothing of the weak vowels in the middle of a word), has given to the Italian language its new and special character.

As to the dictionary, the Italian certainly comprises a goodly number of German derivatives, but incomparably less than the French, and furthermore, has no other ancient or foreign roots, in the way that Arabic is found in Spanish.

Among the pre-eminent qualities of Italian must be put that inner power of preservation which we have already mentioned. Whatever may be the cause — and only in certain parts can it be attributed to the power of literary tradition, that is to say, because its greatest masterpiece, the 'Divine Comedy,' was written originally in that tongue, and afterward the 'Decameron' and the 'Canzoniere,'—this among all the known tongues is the most tenaciously conservative, which is undoubtedly a great advantage, both morally and practically,

Italian is the literary language of the entire kingdom of Italy (with some restrictions among the Valdesi and the French-Provençal of Val d'Aosta), and also of some Italian subjects in Austria, some in Switzerland and some in Malta. Corsica alone prefers French for its literary productions.

The Dialects.— Italy is, in regard to its language, one of the countries most compact and homogeneous. According to the last census (10 June 1911), the resident population numbered 35,845,048, of whom only about 83,300 were of French origin; 9,600 of Teutonic origin; 81,000 of Albanian; 29,000 of Greek; 11,700 of Catalanian origin, and 42,200 Slavs.

Not all the heterogeneous population of the kingdom of Italy can be considered as «colonies» or as «islands.» The following may be considered as «colonies» linguistically: (a) Germans of Veneto, of Tyrol origin (in the 13th century there was an emigration), who reformed themselves into the Thirteen Communes of Verona (reduced, it seems, now to two) and to the Seven Communes of Vicenza (now five at the most) and of Piedmont, around Monte Rosa and at the Simplon (12th and 13th centuries); (b) the Albanians, who form the most important group of foreign languages, not Romance, in Sicily, in Calabria, in the southern provinces upon the Adriatic (from about half of the 15th century excepted); the last colony was Badessa in Abruzzo Teramano (1744); the Slavs in Molise; (d) the Greeks, from Ontrano (9th and 10th centuries); and reduced to very few in Bova in Calabria (11th century). In Corsica, at Cargese, 650 Greeks settled in 1675.

Roman Colonies: The Catalanians of Alghero, of Barcelona origin (1353–72); the few Franco-Provençals or Faeto and Celle (of the time of Charles of Anjou) near Foggia (see following text for the Provençals of Guardia Piemontese in Calabria, for the Lombards in Sicily, etc.); and finally about 3,000 Rumanians in eastern Istria, now strongly Slavic in its language.

But to pass over the Semitics in Malta, we cannot call colonies the Provençals and Franco-Provençals of the Alps, who keep up the idioms of the other slope. The boundary between the Ligurian and the Provençals is to be found at the Roja: Mentone and around there is more Provençal than Ligurian. They may become Provençals — or they may continue many of the Provençal expressions, mixing with them Piedmontese and local words — the dialects under the Maritime Alps and the Cozie, down to the Monviso — to the right of which are the Valli Valdesi (Pral, etc.), with a dialect allied to that of Delfinato more to the east,— and also more south toward the upper course of the Clusone and to the sources of the Dora Riparia. A colony of Valdesi (about 1,400), is Guardia Piemontese in the province of Cosenza.

From the district so influenced by the Provençal, we pass by some intermediate grades, to that which is plainly Franco-Provençal, above all in the valleys of the southern Stura of Orco (Val Soana), of the Dora Baltea (Val d'Aosta). In the Val d'Aosta the Franco-Provençal has its stronghold, so that the language of culture is French. Then follows the Valsesia, plainly Piedmontese of Piedmontese-Lombardian, which forms a sort of dividing wedge between them and the successive Alpine districts of various linguistic types. It is the Ladin dialect which is found in these parts; the Ladin dialect exists in the mountain regions more or less from Mount Rosa and farther. From these Lombardy valleys and especially from the more western, from Toce and from Maggia, alike, come the so-called Lombards of Sicily, of Sanfratello, etc. (11th to 13th centuries.)

The Ladini of the southern slope of the Alps are to-day reduced to very few in number (40,000 Grigioni), losing touch with the Ladini of Italy. To these belong entirely the small central zone, or Tridentine-Bellunese and that which is incomparably the most considerable, the eastern, that is, the Friuli. In official documents the Ladini are considered to be among those who «speak Italian.» Here, in fact, there is no sign of that literary language which the Ladini of Switzerland have; and on the other part nearly half a million Friulani (with about 11,000 in the central zone), form in the southern part of the Alps a strong, flourishing linguistic union, opposed to the few Grigioni, that one could well consider the Ladin an Italian language. At a time not so far distant there was a Friulano dialect as well as a Trieste dialect and a Muggian, now Veneto; at Trieste they still spoke Ladino in the first half of the 19th century; and at Muggia also in the second half.

We now come to the dialects which are usually regarded as Italian.

Dante, in his division of Italian dialects ('De Vulgari Eloquentia,' I, x), which is perhaps the first attempt at any classification of dialects, divides them according to the two slopes of the Apennines, the Tyrrhenian and the Adriatic and counts them off into 14 principal types, seven for each slope. It was without doubt a happy thought, and almost everywhere throughout southern Italy the division of Dante's is similar to our own. We will commence with a general division into four groups; northern, central, southern and Sicilian, and finally, by itself, Sardinia.

A. *Northern Italy.*— 1. The group so-called Gallo-Italiano, that is, (a) Ligurian, (b) Piedmontese, (c) Lombard, (d) Emilian (including the Romagnolo dialect). The most "Gallic" is naturally the Piedmont; the nearest to the Tuscan is the Ligurian, but Liguria, Piedmont and Lombardy form the territory of the *ü* and the *ö* continuing the French type. Emilia in turn is the true home of the *e* for the Latin or Tuscan *a*. This peculiarity appears until we reach the Metaurus River, and pass into Tuscany, into the Aretino dialect. Let us not forget the Genoese colony of Carloforte in Sardinia, and those Emilian colonies in Lucchese, of Gombitelli and Sillano.

2. Eastern Dialects: (a) Istriano, little better preserved at Rovigno and Dignano. It is a very characteristic dialect, with features which recall the Veglioto or Dalmatian dialect, and the dialects of the southern shore of the Adriatic. (b) Veneto, or better Venetian. And among all the dialects, none that arose has had more conspicuous fortune, following upon the arms and the commerce of the great republic; here certainly its progress followed its family resemblance with the Tuscan, for the most part original but to a certain extent borrowed. To say nothing of its fortunes in the Levant, we must make mention that it conquered territory everywhere, in all the cities of the country that surrounded Venice, in Friulano and Istriano. In Venetian, which in its oldest documents shows a trace of Ladino, neither *ü* nor *ö* ever appears: nevertheless there is a strong tendency to drop out the weak vowels; they have the diphthongs *ie, uo,* etc. Very characteristic of this dialect is the aversion to double consonants, that is to say that there, as in Rumanian, vowel quantities remain unchanged when double consonants become simple.

B. *Central Italy.*— 1. Tuscan, with the dialects of Florence and those to the west, Pisa, Lucca and Pistoia; a little aside the southern Senese and then Aretino, of which we have spoken. The western dialects have, for example, *giunto,* like the Florentine, but especially at Pisa and Lucca is the use of *s* for *z* very noticeable, and at Lucca *r* for *rr,* which recalls the Ligurian dialect, etc. For the rest, the cities are all strongly under the influence of Florence. The quite prevalent opinion that at Siena they speak an Italian better than that of Florence comes perhaps from an arbitrary interpretation of the old saying, already common in the 17th century. "Tuscan tongue in a Sienese mouth." The characteristics of the Florentine and Tuscan language of to-day which most strike one accustomed to the Italian of the other provinces are perhaps the substitution of the simple *o* for the diphthong *uo,* as *bono* for *buono;* the aspiration of the guttural *c* between two vowels, *baho,* for *baco, la hasa;* and, we may add, also the pronunciation of the palatal *c* between two vowels, *fece. la cena,* which differs from the explosive *c* following a consonant, as *calce,* etc. But if the Tuscans themselves freely recognize the aspiration of the guttural *c,* as pertaining to a dialect, they will with difficulty arrive at a recognition of the same thing in the fricative *c,* and it displeases them that the latter substitute the explosive *c.* We must also mention the synectic doubling, as *a ccasa, a rRoma.*

2. Umbrian, Marchigiano, Sabino, Aquilano, Roman. This is a group somewhat roughly formed. Dante distinguished, besides the Tuscan, the dialects of Ducato, namely, the Spoletano, and those of Rome on the right slope; Marca Arconitana (between Calabria on the south and the Romagnolo toward the north). Especially, the Romagnolo (as they appropriately term the Tuscan-Umbro). descends much further down the southern marches, and though it loses its more pronounced characteristics, like the *é* for *à,* it joins with the latest offshoots at the Esino, at Jesi (*amigo, pagado*) and also at Ancona (*poga,* poca, *fighi; sonéto,* sonetto, etc.) Perhaps the Spoletano appeared to Dante characteristically for its final *u,* which is usual from the Umbria of the southeast to the edges of Tirreno, and also belongs to Sabino and Aquilano, but not to the western zone of Orvieto, Viterbo, Rome, Velletri. Certain southern characteristics, such as in *nn* for *nd, mm* for *nv, mb,* etc., may be said to be common to all of central Italy, except Tuscany.

3. Corsican.— If it were not for its geographical position, it would be better to place it in this group between 1 and 2, but it has also very close relations with the Ligurian dialect, and naturally as we go further south it comes closer to the Sardinian tongues.

C. *Southern Continental Italy.*— Tyrrhenian Group, or Neapolitan, which extends to the other slope with Molise. The final vowel determines the accented vowel, but this final vowel which at one time had to be *u* or *o, i* and *e,* is now restricted uniformly to an *e,* which we will call short or vanishing: *ome* from *omo,* man, *uomene* from *uomeni; parente,* plural *pariente; porte* from *porto,* I carry, but *puorte* for ports; *negra* but *nigre,* black and black, *sposa* but *spuse,* bridegroom and bridegrooms. We pass over the fact that it has besides *nn* from *nd,* etc., and also *nd* from *nt, mb, ng* from *mp, nc,* but everyone knows nevertheless the characteristic types *chiane* and *sciure* for the Italian *piano, fiore,* which continue in Sicilian, *chianu, sciuri* (also in Genoa, *cian, sciu*); and finally that splendid example of synectic phonetics *'nu vvase* un bacio (a kiss), or *a bbascio,* etc.

2. Adriatic Groups.— Types of the Abruzzi, which comprehend the Capitanata. The foundation is the Neapolitan type, but th examples of the modification of the vowels are more than ever varied and complicated, and the accented vowels disguise themselves and become diphthongs in the most singular manner. Here, as in Sicily, the accenting of the sentence plays an important part, so that the tonic vowel is treated as being weak, if the accent of the entire phrase is not placed upon it.

D. *Sicily,* with which we will unite Calabria: some of their peculiar traits extend to Terra d'Otranto. The consonants are often treated as in Neapolitan, but nevertheless display their own peculiarities. But the Sicilian type has its own peculiar forms for the vowels especially; for instance, in place of the closed *e* or closed *o* of the Italian and the Romance tongues it employs an *i* or a *u; pilu,* pelo, *suli,* sole. As for the diphthongs *ie, uo,* they depend rather upon the accent of the sentence rather than that of the individual words. (See C, 2).

E. *Sardinia.*— The language of Sardinia can be considered as a type by itself, at least as much as the Ladino. Here Dante expressed

the truth very delightfully: "(Sardi) qui non Latini (= Italiani) sunt, sed Latinis adsociandi videntur." ("The Sardinians are not Latins but are to be grouped with the Latins"). The most unmixed type of Sardinian, and hence the furthest removed from the Italian, is that of Logudorese or the dialect of the central part, to which nevertheless the southern or Campidanese dialect is very closely connected; on the contrary, we are far removed with the Gallurese which forms an intermediate passage from Sardinian to Corsican, and hence to Italian; and it is a most excellent example of the rapidity with which, in so short a geographical space, one linguistical type can be joined to another absolutely different, and also of the uncertain and arbitrary character of each classification. Characteristics fundamentally Sardinian, which distinguish it from all the other Romance tongues: It preserves intact the quality of the Latin tonic vowels, that is, each *e, i, o, u,* is here preserved as *e, i, o, u; fide,* instead of *fede, ruge, croce;* no fusion, therefore, of the long *e* and the short *i,* of the long *o* and the short *u;* and, moreover, no diphthongs. In the consonants, it is most noteworthy that the Logudorese preserve intact the guttural pronunciation of the Latin *ke, ki, kelu, cielo* (sky); although probably the course is only like the Sardinian dialect, after having inherited from the Latin vulgate, like all the other Romance tongues, a *ke ki* somewhat influenced by the palate, did not go any further in that direction; and, in short, at a relatively late date, that is, toward about the 19th century the Sardinian tongue lost also the above-mentioned traces of the palatal pronunciation of the Latin vulgate. As an instance which connects the Sardinian district with the Iberian, which has the effect of giving it a certain right to be considered as common ground of transition between the eastern Roman group (Rumanin, Dalmatic, Italian), and the western (Ladino, French, Spanish), and especially of the transition from Italian to Spanish; the Sardinian preserves intact, in the very same way as the Spanish, the final *s* of the Latin; for instance, *fizu* = *figlio* (son), *fizos* = *figli* (sons), that is *filios.* As an article the Sardinian has adopted *su,* from *ipse,* rather than a derivative from *ille.*

The dialects, which we have fully listed, are all, except the Tuscan, sufficiently alive and important from the standpoint of culture, because in Italy even well-educated people usually speak the general dialect with their companions; but not particularly the local dialect, because each of the many small states into which the Peninsula was divided for so many centuries, or at least each of the principal states, developed to a certain extent a language particularly for conversation, which is at the bottom the dialect of the capital city; thus the cultured Piedmontese usually speak the language of Turin, the inhabitants of Veneto, Venetian dialect, etc. And many of these dialects have had a rich poetical literature; although the writers in these dialects were almost always conscious of having produced works purely local in character, and considered their own writings, in opposition to those in the literary tongue, almost as a jest, so that generally they wrote only in a facetious tone. None the less it should be advisable for us to make some distinctions; for instance, the Venetian, which was also the official language of the republic, was certainly in the mind of Carlo Goldoni something more important than a simple local dialect, since in this he wrote some of his best comedies; Sardinia and Sicily also show special conditions. On the other hand, the tone and playful intention take away nothing from the artistic seriousness of a true poet; and Carlo Porta of Milan and the Roman Gioacchino Belli were certainly poets of the first rank, marvelously representing, with cunning satire, the life of their time in Milan and in Rome. To-day the flowery dialect continues; but the Venetian theatre has an importance more than local, and to-day is supported, both on account of the excellence of the dialect itself, easily intelligible to all, and because of the happy continuation of Goldoni's comedies, not to speak of the splendid acting. Little is heard of the Piedmontese theatre, which enjoyed much favor at the time of the formation of the kingdom — and the theatres of Milan little depend upon Milanese actors. The Neapolitan dialect is carried throughout Italy by the charm of its melodies and its voluptuous but sad little songs, but Roman poetry has acquired great popularity everywhere, and this is partly due to the ease of the dialect of to-day, and partly to the Roman poets, especially Belli, but above all to that great and noble artist, as rich in epic and lyrical powers as in popular and pleasing comedy — Cesare Pascarella.

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22. ITALIAN LITERATURE. This article deals with (1) The beginnings of Italian Literature; (2) The age of Dante, Petrarch and Boccaccio; (3) The Renaissance and Humanism; (4) Classicism and Decadence; (5) Arcadia and Rinnovamento; (6) Contemporary period, the *Terza Italia.*

First Period — From the "Origins" to the 14th Century.

Italian literature was late in its beginning, although manners were more refined and the intellectual level higher in the Italian courts and *Comuni* than in the feudal castles of France of the same period. And the League of the Northern Cities against Barbarossa's invasion, the *Vespri Siciliani,* the organization of *Comuni,* the struggle against the encroachments of the Roman Church, the commercial activity of Italian seaports, the establishment of tribunals of justice and city councils, all testify to a comparative maturity of the national spirit. In France 'La Chanson de Roland' was familiar to the Norman invaders of England in 1060; while the first original piece of Italian poetry, 'Il Contrasto di Ciulo d'Alcamo,' is approximately dated 1231.

This late development of Italian literature is chiefly due to the persistence of Roman civilization and the general use of Latin as the written language. For in spite of the many invasions of the Peninsula, the Italian stock is not a recent blend. It is the permanent Roman nationality, and the permanent Roman character. That the tradition of intellectual culture was never interrupted is evidenced by the number of Latin writings even in the darkest periods

of the Dark Ages, showing that the Peninsula has never been without some intellectual light. The empire and the Church, those two supreme powers of the Middle Ages, encouraged respect for the Latin by using it as the official language, and thus contributed to the contempt in which was held the spoken language,—*Volgare*. Even after the noble compositions in Italian, of *Trecento* (14th century), both Dante and Petrarch used Latin in their scholarly writings. This Middle Age Latin literature and the gradual change from *Latino Rustico* to *Volgare Rustico* are considered in the article on the ITALIAN LANGUAGE. Though the *Volgare* was the latest of the Neolatin idioms and was everywhere used, even by the learned in familiar conversation, it was not until 1231 in the *Contrasto* that it found its way into literature. Yet so rapidly was it perfected by Dante, Petrarch and Boccaccio that in Dante's 'Commedia' (1300) Italian attained its splendor and perfection earlier than any other European language.

The feudal ideal of chivalry, imported from France and Germany and unsympathetic to Italian tradition, also retarded the development of a national literature. The *trouvères* of *langue d'oel* and the *troubadours* of *langue d'oc* poured across the Alps and were welcomed by princes and common people. Everywhere these invaders scattered the ideas of their country, and the ideals of their legends. So numerous, noisy and popular were they that the city of Bologna in 1288 passed a law forbidding *quod Cantores francigenarum* from dwelling near the town-hall and disturbing the council. Imitators of the Frence *gaie science* flourished everywhere, as Albertino Malaspina, Rambertino Buvalelli and the Mantuan Sordello whom Dante mentions. After the bloody *croisade des Albigeois* many troubadours sought the protection of the Emperor Frederick II of Sicily. Many other intellectual forces sought the support of that enlightened prince who welcomed *Gli uomini che avevan bontade, giocolieri, sonatori, e trovatori.* On account of the learning and culture that came pouring in from all parts of Italy, the *volgare* used at the court of Frederick was more refined than that used in Naples or in the northern part of Italy, and more free from Latin than the Florentine dialect. And here in Sicily arose the first school of Italian poetry.

There was little originality and less genuine sentiment in these first productions of that school variously named *Provençal, Sicilian* or *Aulico-cortigiana.* It was an imitation in both matter and form from the French model. The sonnet alone where two *strambotti* are joined is original; otherwise the forms are the *ballade,* the *pastourelle* and the *sirvente* of the troubadours. Probably anterior to these is the much discussed *Ciulo d'Alcamo,* or *Cielo del Camo,* with its charming dialogue between an eager lover and a reluctant but finally yielding sweetheart. The first entreating lines *Rosa fresca aulentissima C'appari in ver l'estate* are better remembered than the realistic and more sincere conclusion. The name *Scuola Siciliana* survived the quickly vanished magnificence of the court that fostered it. The Tuscans who had lived in Frederick's court, or corresponded in *Tenzoni,* were known as "Sicilians." Folcacchiero dei Folcacchieri in Siena and Monte Andrea are remembered as "Sicilians" of the second period. To Guido Guinicelli (1240—?) Dante allows the merit of opening a new field of poetry and of giving in the celebrated *canzone Al cor gentil rspara sempre amore* a new ideal afterward called *Il dolce stil nuovo.* Guinicelli, whom Dante calls *Padre mio e dei miei migliori,* went from Bologna to Florence, and inspired poets who introduced the *spiritelli* (impersonations of love), in which there is some psychological analysis and much mannerism. The *Canzone* 'Donna mi prega' of Cavalcante (1260—?) is the most perfect of these. It is a complete scholastic treatise on love's psychology.

The asseveration that the Italian mind is never deeply religious is disproved by the mystic religious poetry which blossomed during the Middle Ages. It was almost localized in Umbria and was chiefly inspired by that gentle apostle of poverty and love, Saint Francis of Assisi, and his followers. Like manna to the hungry were the verses of the *Cantico del Sole,* and many a humble soul was inspired to imitate the *Laudi* of which every religious brotherhood had its own sacred stock. Jacopo Benedetti, known as Jacopone da Todi, is the best known of these religious poets. His 'Laudi' which he called *sacra pazzia* (holy madness) consist of endless exclamations and repetitions of tender worship of the Madonna and supplications that God should severely punish his sins.

The prose works of this period were mostly written in Latin or French and do not form a part of "Italian" literature. 'Tristano' is perhaps the earliest Italian version of those *Chansons de Geste* usually written in poor French. The 'Buovo d'Antona' and the 'Storietta di Troia' are mere translations and adaptations. There is more originality in the 'Novellino,' where, though the Bible and French *Fabliaux* furnish most of the material, there is also mingled a certain amount of local color. 'Il Libro dei Sette Savi,' the Italian version of the Seven Wise Men, first told in India, and repeated in all the literatures of Europe, is an interesting example of the common source of all literature, and the intimate relations of migratory peoples. The few *Croniche* are historical works where imagination frequently supplies the place of fact. The *Fiori* are confused and pretentious aggregations of information about many things. Guittone d'Arezzo's 'Epistles' are the first example of that pompous Latin elegance and correctness so often affected by later writers of Italian prose.

IL TRECENTO, 14TH CENTURY.

If the 12th century was the early springtime of Italian literature, a time of seed-sowing and germination; followed in the 13th century by the first fruits of the harvest; then the 14th century may be considered the glorious summer of fruition. Before the opening of *Trecento* the foreign forms and ideas had been assimilated, transformed by Italian genius. Epic and lyric poetry, romantic and historic prose, were now Italian in character. Guido Guinicelli and Guido Cavalcanti had initiated the *Dolce stil nuovo;* Guittone d'Arezzo had written the first pure and stately Italian prose. And now began the century made glorious by Dante, Petrarch and Boccaccio.

Dante.

The facts of Dante's life belong to history, but the vicissitudes of his love, the evolution of his soul, stand within the compass of literature, they explain and reveal his immortal work. He was nine years old when first he met Beatrice, a child of eight; nine years later he again met her in the street, and was favored with her gentle *saluto*. In that instant love mastered his soul, Beatrice was the only object of his thought. The death of Beatrice did not break the charm, though for a moment Dante was attracted by a gentle dame who with him bewailed his great loss; but soon he returned to his worship of Beatrice's memory. 'La Vita Nuova' records the incidents and emotions of his love for Beatrice. Through these sonnets and *canzoni*, linked together by prose comment, runs a vein of tender melancholy, a spirit of transcendentalism. The canzone *Donne che avete intelletto d'amore* is in the *Dolce stil nuovo* introduced by Guido Guinicelli, with a metaphysical deification of feminine beauty as an emanation of Divine Love as a means of salvation. The sonnets 'Vede perfettamente ogni salute,' and 'Tanto gentile' are gems of lyric poetry, and the vision *Donna Pietosa* is of classic simplicity. After telling of his grief at the death of Beatrice, he describes his vision of her soul rising to the glory of Paradise amidst a choir of cherubims singing praises. In Dante's 'Canzoniere' are other beautiful lyrics, some with the same inspiration as in 'Vita Nuova' and others, known as *Rime petrose*, composed in a different spirit; perhaps inspired by a woman named Pietra. 'Convito' (as the name signifies), is a "banquet" of spiritual food in the Italian language, for those who could not read Latin. Philosophy, astrology, morals, religion, a compendium of the Ptolemaic system, and a dissertation on the destination of the human soul, all are included in this feast; all presented in noble poetry and splendid prose. The *Canzone* 'Voi che intendendo il terzo ciel movete' show how genius can transform dry dogmatic into a noble hymn of beauty. In 'De Monarchia' the question which then divided the world—whether the Church should dominate the empire—is argued from the Ghibelline (or Imperial) standpoint.

La Divina Commedia.

Though doubtless his other writings suffice to place Dante among those illustrious Italians whose composition will always be read, it is because of 'The Divine Comedy' that Dante ranks as the chief glory of his nation, crowned with the same immortality as belong to Shakespeare and Homer.

'La Divina Commedia' was called "Commedia" by Dante, "Divina" being added immediately after his death by his admirers, and since universally accepted.

Poets, painters and preachers before Dante had attempted uncouth description of the three realms of Punishment, Expiation and Reward. Orcagna's frescoes in the Campo Santo of Pisa are a familiar illustration. From these Dante appropriated freely; his rich imagination and stern logic transforming all into a complex yet balanced harmony. The structure of the poem is simple and symmetrical in its *ensemble*, but elaborate in its detail. The *Inferno* is a huge inverted cone, opening directly under Jerusalem, its outside edged by *Anti-Inferno*, which in its turn is circumscribed by the river Acheron. The interior of this cone is divided into concentric rings (cerchi). In the upper, which is also the outer circle, the punishment is least, and increases in severity as in each successive descending concentric circle the sins to be punished increase in turpitude. The bottom of this cone is formed by the funnel in which Lucifer became wedged half way, hurled down head foremost from the *Empireo*. His beastly triple head is in *Inferno*, while his legs form the central point of the opposite mount of *Purgatorio*.

Opposite to *Inferno*, in exact but inverted symmetry, rises the mount of *Purgatorio*, divided into a sequence of terraces corresponding to the *cerchi* (circles) of *Inferno*. Each terrace contains a certain category of sinners, the lowest being the worst. As *Inferno* had an Anti-Inferno and a final city of *Dite*, so *Purgatorio* is preceded by *Anti-Purgatorio*, surrounded by the Eden or Terrestrial Paradise encircled by the rivers of Lethe and Eunoe that wash away every recollection of sin. *Paradiso* is also imagined on the plan of concentric circles, in accord with the Ptolemaic system. Only in these spheres of splendor the Blessed are not constrained to any fixed place, but soar freely from one circle to the other, and they all have their appointed seats in the mystic Rose, whose centre is God Himself.

The symmetrical harmony of the 'Divine Comedy' extends to every detail. Nine circles in Hell and Anti-Inferno, nine terraces in Purgatory and Anti-Purgatory and nine spheres in Heaven and the Empireo. The two outer circles of Hell form the city of Dite, the last two of Purgatory the Terrestrial Paradise, and the last two spheres of Heaven the mystic Rose. The 33 cantos are divided into three parts, the repetition and multiplication of these leading up to nine, the perfect number composed of the Trinity multiplied by itself. Each of the three parts ends with the word *stelle*. The material unity of this hugely imagined construction is shown in the line which, straight from the centre of the mystic Rose (centre of Paradise), forms the axis of Mount Purgatory, passes through Lucifer's body and reaches Jerusalem. This symbolic line, reaching from God Himself, through the realms of glory, expiation and punishment, to Jerusalem, uniting the Church triumphant with the Church militant typifies Redemption. Lucifer, in falling from Heaven has formed the hollow of Hell, and the opposite mount of Purgatory was formed by the horror which made the very earth recoil at his passage. Salvation for a sinful world staring from the Cross of Calvary at Jerusalem, conquers Hell and by the purifications of Purgatory reopens Heaven, the dwelling-place of God, to redeemed mankind. This unity of conception is continued in the three allegorical significations of the *Commedia*, the personal, moral and political. Considered as personal to the poet, Dante's journey begins on Easter Day 1300, the Year of the Jubilee, and lasts seven days. Dante, then in middle life, finds himself in a forest in sight of a hill, sun-illumined at the top, his path opposed by three beasts—his sins;—he is rescued by Virgil, who by Beatrice's command

shows him the realms of punishment and expiation. In the political allegory Virgil, typifying the Power of the Empire, leads mankind through the realms of punishment and expiation up to the Terrestrial Paradise from whence Beatrice, signifying religion, conducts him through Heaven. In the moral allegory Virgil is human reason, Beatrice is Faith and all the Scholastic controversy is developed by Saints Thomas, Dominique and Peter. In *Inferno* the ghosts or shades endure pain in the flesh, hopelessly conscious that pardon is past praying for. In *Purgatorio* the expiating soul is comforted with the certainty of ultimate pardon and with bright visions of happiness. In Heaven the souls are no more shades but lights. It is an ocean as full of brightness as Hell was black.

Of the myriad beings who people these three realms of hell, purgatory and heaven, Dante's supreme creation is Lucifer. Indeed, this personification of Evil is the supreme intellectual conception of the Fallen God of all literature and of all time. Dante in some measure attained to and completed what Æschylus essayed. Dante's Lucifer is as repulsive as Milton's Satan is fascinating. All glory is alien to him; all things of sin are a part of and have their source in him. He is all-evil, Evil, and enduring, the author of all the sin mankind endures, the loathsomeness of his person, the vileness of his acts, the futility of the motion of his vast bat-like wings, the worst of the hugeness and horror are indescribable. "At each of his three mouths he with his teeth is crunching a sinner in the manner of a brake." Brutus Cassius, Judas Iscariot! These are the three arch sinners whom Satan's teeth are champing. The first betrayed his king, the second betrayed his friend and king, the third betrayed his friend, his king and his God. And all about is ice and life-congealing winds, the intense darkness of the vast cavern in which the strange voices of Dante and Virgil sound alien, hoarse and hollow.

There are many other stupendous descriptions in the *Commedia*, powerful apostrophes, withering invectives; the haughty words of Farinata degli Uberti, rising from his tomb; the piteous stories of Francesca da Rimini, and of Pia dei Tolomei; the description of the serpents growing into men, then burning down to ashes and forever repeating this atrocious torment; the appalling picture of the forest of withering branches weeping their intolerable misery in drops of blood. Shakespeare has more chords to his lyre, and Homer often rises to supreme heights, but with Shakespeare and Homer will ever be associated in an immortal triumvirate the name of Dante. He remains the chief glory of Italian literature, and a world poet of the highest rank. Cino da Pistoia, after Dante, the most delicate of poets of the *stil nuovo*, has left many sonnets, ballads and *canzoni*, in which he sang his love for fair *Selvaggia*. His passionate verses alternate moods of joy and grief, and show some psychologic observations. Cecco Angiolieri writes with humor, despair and gaiety. There is also ample and interesting material in the prose writing of the time. The 'Fioretti di San Francesco,' a compilation of legends and sayings about Saint Francis of Assisi or attributed to him, are exquisitely simple and of deep piety. Dino Compagni's *Cronica*, and the *Cronaca* of the three Villanis describes the world in which Dante lived.

Francesco Petrarch, 1304–74.

If Dante was the last splendid representative of the Middle Ages, Petrarch was the rising sun of the Renaissance. The first sang the mystic contemplation of other-world ideals, the second initiated the study and observation of the human heart and of terrestrial beauty, and was a prey to that contrast of moods which make him the first victim of pessimism in literature. Petrarch's love for Laura, his habits of elegance, his affection for rare manuscripts and classic authors, his craving for perfection of literary form, jarred cruelly with the religious sentiment which became supreme in his later years. In Petrarch's poetry there is a cry of human suffering, a sincerity of expression which separates it from any previous composition. 'Il Canzoniere' is a searching analysis of a single sensation, the psychology of a single soul. When Laura dies, Petrarch's grief is a brooding melancholy, less ascetic and more tender than the devotion professed by other poets of the *stil nuovo*. There are many chords in Petrarch's lyre, and Laura's praise is sung in many moods.

'I Trionfi,' an allegorical poem mostly in *terza rima*, narrating the triumph of Love, Death and Fame, is a continuation of the *Canzoniere*. Petrarch is the poet of love, but he is also the first Italian poet who has intensely felt and sung of patriotism. He dreams of an Italy direct heiress of the Roman Republic of Scipio, powerful in the liberty of Communes; yet he perceives that a national monarchy is the best available form. In Petrarch's writings there is an exaggerated attention to form, though it never quite becomes mannerism as it does with his imitators.

Giovanni Boccaccio, 1313–75.

Boccaccio was a scholar possessed with the imagination of a poet, a ready wit and the charming manner which secured for him, the bastard son of a merchant, the welcome of princes and the love of a princess. His comprehensive soul and rich nature epitomize his age and country. He is delighted with the discovery of an ancient manuscript, first realizes the greatness of Dante's poem and spreads the knowledge broadcast; yet though abounding in literary work and scholarly study he finds time for business and also for public affairs. 'Il Filocolo,' 'Filostrato' and 'Il Ninfale Fiesolano,' are praiseworthy stories, overcharged with ornament; but 'Fiammetta' is a literary event, the first psychological novel. Only Dante's 'Vita Nuova' had contained such subtle investigation. 'Fiammetta' is Boccaccio's own love story, and possesses an accent of sincerity that all the borrowed elegance of Latin models cannot disguise.

The 'Decamerone' is Boccaccio's immortal masterpiece. Over Florence (1348) hangs the horror of the plague. In a delightful villa outside the city a company of gallant youths and gentle maidens have gone for safety, and to seek distraction from thoughts of death and disease through present enjoyment and the telling of tales. The party of 10, during 10 days, tell 100 stories. A crowd of personages are introduced; the diversity of situation, the fer-

tility of invention or of adaptation, the abundance of familiar detail give us unsurpassed pictures of Neapolitan and Florentine life of the time. Knights and princes, artists and poets, gentlewomen and merry wives, friends, friars, hostel-keepers, shrewd merchants and lusty clerks, all move and speak in the gay medley of real life. The attacks on the clergy were warranted by their immorality, and Boccaccio's obscenity completes his picture. He borrows from all sources, chiefly from French *fabliaux*, with the one purpose of correctly representing the real world around him: its interests, its virtues, its vices. He is a pagan, as are the shrewd, prosperous Florentine pagans about him, those whom Carducci calls *il popolo grasso*, enjoying life and indifferent to any future finality. His only reverence is for Art, which he worships so ardently as to have given to his own work a correctness which ranks him as one of the intellectual triumvirate that molded the Italian language, and even the very spirit of the nation.

In perfect contrast with the irreligious and artistic world of Boccaccio and his imitator Franco Sacchetti and their disciples, loomed a great ascetic spirit, an inspired apostle, who subdued the fiercest and humbled the proudest, by declaring the simple message of Jesus Christ; an illiterate woman of humble birth, Santa Caterina da Siena. Unquestioned faith in herself and her holy mission gave authority to her word, eloquence to her epistles and reminiscences, most uncommon among Italian writers of that or any other period. It is another miracle of the power of Faith.

Il Quattrocento — 15th Century. The Renaissance.

If the *quattrocento* (15th century) seems to have produced little that is memorable in Italian literature, the barrenness is only seeming. It was a seed-germinating century, wedged in between the glorious 14th and the brilliant 16th century. A century of progress in classical studies, a period notable in the evolution of the national conscience. Petrarch and Boccaccio only a little forestalled their countrymen, and "Humanism" soon spread over all Italy.

Whether the word "humanism" be given its Latin signification of gentleness, courtliness; or is understood as emphasizing the human rather than the religious ideal it equally accorded with the Italian 15th century spirit — a spirit of rebellion against the papal and imperial influences which dominated the Middle Ages. Italians have always claimed to be the inheritors of the Roman world, and to have uninterruptedly continued the classic tradition, and the claim was certainly justified at this time, when Latin civism was asserted in the free *Comuni*, when emphasis was given to the Latin language, and when under the patronage of Cosimo de Medici, in the *Accademia Platonica*, meeting in the villa belonging to Marsilio Ficino, learned scholars and philosophers, in purely pagan spirit, disputed respecting Plato's and Aristotle's dogmas. Some timid priests, it is true, opposed this humanism, which, with its pagan myths, philosophic inquiry and sensuous beauty threatened the Church's supremacy. But soon scholarly and epicurean prelates and popes (Niccolo V and Pio II) were themselves seduced by humanism, and turned the current of reviving philosophy and letters to the adornment of the Church, if not to the increase of her faith.

These literati were obsessed with admiration for letters and ancient manuscripts and especially for elegance of Latin style. Yet they were more than mere pedants. Working away from the individualistic ideal of the *trecento*, they broadened the range of studies, in the universal Latin language which they called *Lingua Nostra*, opened a large field of investigation to the human intellect, now released from the limitations of scholasticism, helped the progress of humanity and taught princes and potentates to pay homage to learning. The second half of this century was marked by the fall of Constantinople, which left Italy the sole surviving warden of classical tradition and its princely courts the only asylum for fleeing scholars and philosophers. The invention of printing spread learning and literature among large numbers. The splendor of newly established courts, each eager to make the people forget their former liberty; in Rome the returning popes, in Naples the House of Aragon, in Ferrara the Este, in Florence the Medici and others only less bright because of their lesser importance, all exerting their influence for the glory of letters.

Neapolitan literary life was in the beginning aristocratic, Latin and scholastic; a concourse of rhetors, grammarians and linguists, of whom Gioviano Pontano (1426–1503) and Jacopo Sannazzaro (1457–1530) are types. Pontano's hexametric 'Eridanus,' and hendecasyllabic 'Seu Baiæ,' imitate Ovid and Catullus, and sing of lustful love. Sannazzaro's 'Arcadia' presents with more refinement scenes of pastoral life, pictures of innocent gaiety and simple stories of love veiled in melancholy. Florence was not more world-famous for her commerce than for her glorious triumvirate of *trecentist* poets, and for possessing the literary language. In the Florentine crucible classic and Christian ideals were fused, and from her alembic issued the most perfect examples of humanistic literature. Lorenzo de' Medici correctly represents these Florentines over whom he ruled. His admiration for every form of beauty, every phase of human thought; his preference for classic forms, his predilection for pompous and bright pageantry, even the drinking songs (*I Beoni*), which he composed in the solemn, almost religious metre of *terza rima*, are typical. Because he so completely impersonated Florence, Lorenzo de' Medici loved Angelo Poliziano (1454–94) and Luigi Pulci (1432–84). Poliziano, beginning with Virgil, rifled his gems from all poetic caskets; yet with such gift of assimilation that his *Stanze* are more than mere stolen mosaics. Pulci's 'Morgante' is also a rare product of imitation and assimilation, an endeavor to make ideals imported from chivalric feudal France blossom in democratic Italian atmosphere.

But this chivalry of the North, which in the two preceding centuries had so poorly flourished in the soil of Roman civism, in the 15th century degenerated into the vulgar poetry of wandering *cantastorie*; catering for the amusement of unheroic *popolani* in the piazzas; and of such farragoes of heroic episodes and pseudo-history as 'I Reali di Francia,' which

even in this 20th century is still read in many rustic Italian households. Sceptic scholars like Pulci used these popular errant knights, giants and enchanters as a convenient framework for their own image weaving. Count Matteo Boiardo (1434–94), of aristocratic Ferrara, treats his chivalrous heroes with respect. He adorns his stories with classical embellishments, and prefers the gentle knights of the Round Table to the stern warriors of the *Chansons de geste*, as is indicated by the very title 'Orlando Innamorato.'

There could be no lyric poetry in this age which ignored the charm of intimate self-communion and was content with the popular *canzonetta* and *rispetto*, or with metrical imitations of Petrarch. The religious drama (in a century in which the solitary voice of Savonarola cried in the desert) became an anachronism. Soldiers with muskets stalked through the scenes of the Sacred Passion and angels lisped the prologue. Even the popular 'Santa Uliva' is without literary value. Discarded by scholars, used only for familiar epistle or merry *novelle*, Italian prose only reaches terseness in the instructive writings of artists like Leon Battista Alberti (1407–72) or Leonardo da Vinci (1452–1519), careless of literary form; and in a few such passionate orators as Savonarola and San Bernardino da Siena whose eloquence is inspired by the intensity of their convictions.

IL CINQUECENTO.—16TH CENTURY.—CLASSICISM.

The *trecento* which witnessed the disintegration of feudalism and the partial destruction of ecclesiastical domination—those two foes of Italian Nationalism—produced Italy's chief literary glory, Dante's 'Divine Comedy.' The *quattrocento* replaced the mystic Christian Idealism of the Middle Ages with purely pagan ideals of human happiness and beauty. It established Italian as the literary language in place of the discredited Latin, witnessed a literary assimilation of classic ideals with modern observation, saw an unparalleled development of the artistic sense, a refinement of manners and a fastidious taste which penetrated every part of the Peninsula. The *Cinquecento* witnessed the decline of Italian Nationalism. A French army invaded Italy (1494), Rome was sacked (1527), Florence fell (1530) and Charles V was crowned in Bologna (1530) by Clement VII; strange contrast with so splendid an era in Italian Arts and Letters! Political disintegration coincided with the integration of the national language, and the spread of national literature. This age of foreign and civil wars, of broken confederacies, of traitorous leagues, is the age of the establishment of new æsthetic ideals and forms of composition, and of that sense of finality which indicated the maturity of Classicism. Erudition, disciplined by antiquity, curbed extravagant attempts to create new literary forms. The *Cinquecento* had all the perfection and all the limitations of undiscussed classicism and aristocratic culture. Popular elements of inspiration in stories of chivalry, sacred dramatic representations, and popular forms of composition, like the *ottava*, the *canzonetta*, the comedy, were assimilated by courtly men of letters and the common people retreated from important participation in literary productions.

Machiavelli, Ariosto, Arentino, Cellini, Tasso, represent this 16th century.

Niccolo Machiavelli (1469–1527) is the product of this age. He impersonates that fundamental element of the Italian character—the spirit of ancient Rome. His admiration is for strength and its result—success. The greatest sin is weakness and failure. The weakling, possessing velleity without power to compel accomplishment, is despicable. Careless of religious dogma, indifferent to moral teaching, the end always justified the means. The welfare of the state is the *suprema lex*: under his intent observation personages become meaningless appearances, events become important, and beyond the passing phenomena he perceives the everlasting law.

The Florence of the Medici shared Machiavelli's unprejudiced views and even his apparent contradictions. He planned the institution of a republic in his 'Discorsi,' yet in 'Il Principe' hailed the advent of the masterful tyrant, who like Cesare Borgia would shake off ravenous invaders feeding on the vitals of Italy, and, unrestrained by any obstacle or moral consideration, would accomplish the unification of Italy; and Machiavelli's fellow-citizens connived at his partiality in retracing historical events in 'Storie Fiorentine,' since the inaccuracy best served their purpose. In the comedy 'La Mandragora,' Machiavelli, with genuine psychological observation, satirizes contemporary society. Though the argument is obscene, there is excuse for unmasking perverted and perverting friars like Fra Timoteo, and in exposing the evil influence of an immoral priesthood on simple-minded women. Francesco Guicciardini (1483–1540), though his history is better constructed than Machiavelli's and more accurate, is an opportunist. He submits to the oppression of unavoidable despotism, and impersonates a weaker generation. The 20 volumes of his 'History of Italy' comprise the important period of the competition between France and Spain.

If Machiavelli typifies the intellectual Roman element of the Italian race, Ariosto, Machiavelli's contemporary, represents those foreign elements, mediæval and poetical, which are also a part of the Italian mind. Though he, too, is familiar with classicism and Latinity, they are acquired qualities. It is the legends of chivalry, the *chansons de geste* and epic poems, which fire his imagination; and he expresses his poetry in the popular rhyme of the *ottava*. Ariosto's poetry is bright, spontaneous, sparkling. *L' art pour l' art* was the ideal of this diligent toiler, who without passion, faith, patriotism or religion, yet labors unweariedly to produce artistic beauty. The world he represents, the society that first inspires and then admires his work, equals him in indifference to moral and religious ideals. The 'Orlando Furioso,' Ariosto's masterpiece, is an accurate résumé of *Renaissance* sentiment. The paradise of pastoral simplicity which he describes is opposed to the court slavery under which he is restless. In Italy, chivalry was not a tangible reality but a traditional fiction, a fabric of the imagination to inspire popular minstrelsy and courtly poets, and held together by the gossamer links of a code of gallantry. Chivalry, like *Cinquecento* mythology and religion, could no longer inspire heroic deeds or write

epic poetry. Raphael with equal earnestness painted a Madonna or a Galatea, and Titian a Venus or his sweetheart; so Ariosto utilized tradition, legend, imagination in his poem; eager for beauty, and indifferent to the moral content.

'Orlando Furioso' opens with the Saracens in France; they have defeated Charlemagne and are besieging Paris. The episode of this war ending in the victory of the Christian emperor, and the flight of Agramonte and his death in combat with Orlando, is the plot which binds together the many stories and endless episodes. The story of Prince Ruggiero the Saracen, and his marriage, after conversion, to Bradamante, the Christian heroine, is a glorification of the House of Este, which was the issue of this marriage. The episode of the fair and frigid Angelica rescued from the sea monster is very popular. Crowds of personages swarm in this poem, so full of imagination and actuality. Some of Ariosto's heroines are veritable amazons testifying to their love by feats of warlike valor, and contrasting with other heroines, full of sweetly touching timidity. Ariosto's style and versification are faultless. To have written with such perfect cadence and just management of measure, it is said he must have thought in *ottave*.

No history of *Cinquecento* literature should omit the shadow typified by Pietro Aretino (1492–1556), the cynic pamphleteer, whose impudence in selling his defamatory verse, or his silence, is equalled by the immorality of the popes and princes who bought and flattered him. Machiavelli the philosopher has an ideal of virtue; Ariosto the poet has an ennobling vision of beauty; even time-serving Guicciardini lives an unblemished life and believes that virtue is a good policy; but defamatory Aretino, son of a courtesan, bullies and blackmails; like a ravenous wolf he seizes his prey with violence and impudence. He wears his pen like a dagger, ostentatiously; he wields it like a coward. He surpasses the villain in the villainy of his libels, and is chief among braggarts. Yet, if we are content to take his viewpoint, his picture of his times and contemporaries is true. In this consists its value in a history of Italian literature.

LYRICS, TRAGEDY, COMEDY, IMPROMPTU, FARCE.

This *Cinquecento*, so intellectual and learned, gay and witty, betrays its emptiness in a flood of insipid lyrics, produced in imitation of Petrarch and Sannazzaro. Brightest exception is Michelangelo, who whether voicing his wrath at political corruptions or singing his passionate friendship for the widow, Princess Vittoria Colonna, has always strength and nobility of utterance. That same Vittoria Colonna herself wrote praiseworthy sonnets, full of feeling. Tragedy went limping in a moral atmosphere that neither inspired nor could appreciate tragic feeling. The 'Panfila' of Pistoia is a clumsy adaptation of Seneca and is typical. Giraldi's (1504–73) 'Orbecche' is more original and shows good intention. Aretino's 'Orazia' lacks genuine merit and would have passed without honor in a less barren moment.

There arrives in the development of every race, as well as of every individual, a certain period characterized by great curiosity to behold itself as in a mirror; an inordinate desire for self-knowledge. The *Cinquecento* led the Italian people up to that stage of self-consciousness, hence the popularity of comedy, a form of composition that vividly pictures society, and presents its manners and spirit in the idiomatic language of familiar conversation. Lewdness characterizes all these plays, because cynical and unconcealed debauch was characteristic of the age. In the palaces of princes, in the halls of academies, in the *Parlatorio* of every worldly convent, the occasional stage was prepared; and famous artists assisted in the creation of gorgeous scenes and costumes; while the common people delighted in the popular dialogues (*gliommeri*) of the Jugglers. Out of this varied material finally evolved two sorts of composition, each having its own audience. If the dulled palate of the intellectual *blasé* in princely halls preferred the idyls of the Pastoral drama, the larger audiences of the common people delighted in the rude wit and impromptu dialogues of the 'Commedia a Soggetto,' spoken in the local dialect. Satire is also a mirror in which the complacent society of *Cinquecento* delighted to observe its own reflection. Francesco Berni (1497–1535) held up just the reflection to please his contemporaries. The correctness of his style, the elegance of his verse, made the dainty frame. Berni wrote for the enlightened *bourgeoisie* of whom he was a part, in that style known from him as *Bernesco*, a parody of Petrarchism, a mixture of classicism, mannerism and realism; apparently rude, really fine art. In his *Capitoli* tercets he laughs at the rudeness or obscenity he records and without bitterness satirizes the immorality of all churchmen, from Pope Clement to the poor parish priest, the comfortless hospitality of whose parish house is wittily described in 'Fracastoro.'

The prose writings of *Cinquecento* may be briefly summarized in the unassuming composition of story tellers, biographers and essayists. Giorgio Vasari's (1511–74) 'Lives of Painters' is a storehouse of information from which even modern critics are obliged to borrow. Benvenuta Cellini (1500–71) in his 'Life,' even better illuminates the varied aspects of an artistic career and the strange relation between *Cinquecento* patrons and their *protégés*. Cellini wields his pen as he wields his chisel, masterly. In both cases his figures stand in relief. He professes and lives up to the moral standard of his time. His imprisonment is a misadventure which breeds no introspection and arouses almost no protest. Cellini's prose style is free, flowing, terse and picturesque, equally removed from vulgarity and pedantry. Baldassar da Castiglione (1475–1529) in his 'Cortigiano' with classical elegance discourses of good manners. So does Giovanni della Casa (1503–56) in 'Il Galateo.' 'Il Cortigiano' is the paragon of courtiers; 'Il Galateo' is the handbook of every polite person and has been republished many times. The *Novelle*, or stories, amply illustrate the infinite variety between different regions of Italy, they abound in local color and allusion and diversely mirror the different localities. Lasca, bright, witty and plebeian, correctly displays the character, life, instincts and ideas of the Florentine citizen. Brandello, once a friar, then a bishop,

pompous, courtly and refined, in his 200 stories reproduces in another series of pictures the customs and life of his times.

The second half of the 16th century witnessed a great change in this bright Italian world. The long gathering darkness settled in the double pall of Spanish servitude and Catholic obscurantism. The Italian intelligence has always been either Roman Catholic or rationalist. Some, like Machiavelli, have considered religion as a question politic or artistic, neither to be discussed nor denied; others, like Savonarola, have demanded a reform of clergy, but not of dogma. But while other countries were shaken by religious storms and persecutions, in Italy there was no strife and consequently no victory. The heavy hand of the victorious papal power was accepted indifferently. The Council of Trent (1545–63) enforced discipline, which was resumed in the axiom *Si non caste tamen caute* and encouraged hypocrisy. The institution of the "Index" comforted timid souls, scandalized by the current freedom of thought and license of expression. The Cardinals in Council could neither create a religious spirit in Italy nor seriously reform the clergy; but they did try and partially succeeded in creating the appearance of this double reform. In the country where Savonarola had been an anachronism, and where Socinius found neither disciples nor opponents, there could be no real revival of faith; but society asserted the appearance of decency; and literature, assuming the forms of religion, without altering the paganism of its informing spirit, declined into the vacuity and affectation, hyprocrisy, pedantism and mannerism, which culminated in *secentismo*.

Yet two genuine poets and one immortal masterpiece brighten the gloom of the closing *Cinquecento*. Guarini's 'Pastor Fido' and Tasso's 'Aminta' mark the momentous parting between classical *Cinquecento* and rococo *Seicento*, and they gleam with the beauties of both. This is a new and delicate art. Sensualism is veiled in sweet melancholy, a melancholy as indefinite as it is alluring; (a modern expression) and delicacy of images.

There have been privileged poets whose souls have vibrated in unison with an environment which they have identified and represented in the serenity of mutual comprehension. There are others, the martyr poets, who have been doomed to live in times and places in bitter contradiction with their own nature: of these the most unhappy is Torquato Tasso. Both the exterior and the spiritual conditions of his life were intolerably miserable. As a man — whether as courtier or as lover; as a spiritual being — both as Christian and as poet, there was eternal warfare between his character, his circumstances and his environment. There was ample cause for his insanity and for his subsequent pitiful death. Tasso's heart full of tenderness and sentiment craved love in the loveless circle of court life; Tasso's soul craved the comfort of Faith and of a spiritual religion; and the Church gave him sophism and formalism. He was a feather, beaten and tossed upon a stormy sea. When at last after pitiful misfortune, imprudence and illness, he was visited by a gleam of glory, cheered by a ray of hope, then he died; he died, and the bells of the capital pealed for his incoronation; the laurel crowning of the author of 'Gerusalemme Liberata.'

Tasso's great poem glorifies the second Crusade, the battles between the Christian army under Godfrey of Bouillon and the Infidel under Aladin. The love of Tancredi for Erminia, of Olindo for Sofronia, the enchantments of Armida's garden; how eagerly have they been read, how freely imitated! The weakness and yet the charm of 'Gerusalemme' is that this poem, having the heroic or epic form, is lyric and sentimental in inspiration. Modernity characterizes Tasso's poem; a sympathizing introspection. It thrills in the immortal smile of Armida's eyes, it is beautifully analyzed in that scene of beauty, the death of Clorinda. 'Gerusalemme' was the last glory of *Cinquecento* before the gloom of *Seicento*.

Il Seicento.— 17th Century.— Decadence.

In his 'Promessi Sposi' Manzoni has vividly portrayed that wretched contrast in Italian 17th century life between the actual poverty and weakness, and the inflated magnificence and insincerity which in art produced *barrocchism* and in literature produced *marinism*. What the over-ornamented statues of Bernini, or the *façade* of San Mosè in Venice are in sculpture, the poetry of Marino is in poetry: productions vacuous in conception, lavish in embellishment. But life is more than poetry and the plastic arts, and these do not completely represent the evolution of the Italian people. Though the *Seicento* is the most barren in the history of Italian literature, it is also the century of such solitary souls as Giordano Bruno, Tommaso Campanella and Galileo Galilei and Paolo Sarpi; a period of travail from which was born the modern spirit and the beginnings of a new era in Science and Letters and experimental philosophy; the more beautifully bright when contrasted with the surrounding meanness and spiritual poverty.

Secentism in Italy, *euphuism* in England, *le style précieux* in France, *gongorism* in Spain are all equivalent phenomena. The mannerism of this period can be traced back even to Petrarch, and is seen in Tasso, but it only became overwhelming under the double pall of Spanish and papal oppression that now weighed upon Italy. It was not the special fault of any individual poet or prose writer, though some were greater sinners than others; it was the characteristic of the century, this moral inertness, this soul vacuity, this pretension, this imbecility, virtuosity and affectation of glitter that was not gold, nor even pure brass. Love, that informing spirit of all lyric poetry, which had been allegorical and mystic in the Middle Ages, æsthetic and sensual in the Renaissance, now became a mere rhetorical artifice, a *leit motif* for infinite melodious and fantastic variations and multitudinous images, and minced and prated in sensual trifles. In the pages of the crowds of epic poetasters striving for immortality along the path of Tasso and Ariosto, the word "heroism" echoed as sounding brass and tinkling cymbals. The more religion, morality and patriotism — those great lights of inspiration — grew dim in the souls of men the more did the marshlight of imitation elaborate with emptiness the pages of these versifiers.

Yet never had the forms of composition been more elaborate and finished; all the spoils of the past, all the treasures of classicism and Renaissance, were at the command of these witty, refined, but sceptic, wearied and unspiritual poets incapable of either Pagan or Christian ideals. Giambattista Marini (1569–1625) is the epitome of *Secentism*. What Bernini is to Michelangelo, Marini is to Tasso and Petrarch. The same fatuity which multiplies the flowing draperies around the sculptured figures of the one fills the poems of the other with strained images, extravagantly expressed. Marini, with his ample imagination, familiarity with classic models, facile devices of lewdness, grossness of detail, excessive ornamentation, extravagant metaphors, remains a curious document of the degree of aberration into which a civilized society can fall at some turning point in its evolution, when the intellectual lights of the past have grown dim and the beacon fires of the new age are not yet perceived. *Toute société a la poésie qu'elle mérite* and Marini's 'Adone' was as low as the society for which it was written. Even the pulpit caught the infection and the cheap rhetorical *falbalas* of Padre Segneri were greatly admired. At least these writers and orators gave to their most meaningless sentences the charm of melody, they possessed the gift of style.

Alessandro Tassoni was a man discontented with his own lot and who perceived the emptiness of the world about him. Witty, pungent, impudent; his invectives, libels and satires struck everything he disliked, especially the Spanish oppressors of Italy and the sometimes subservient Savoian princes. His 'La Secchia Rapita' was the sort of ridicule which could prove effective, but his critical essays 'Pensieri' have slight literary value.

Francesco Bracciolini's 'Scherno degli Dei' is a parody of mythological legends, and Lorenzo Lippi's 'Malmantile' is still a mine for students of old Tuscan customs, proverbs, traditions and popular sayings. In Florence, Francesco Redi (1626–98) unearthed the antique dithyramb. His 'Bacco in Toscana' is still quoted. If Vincenzo da Filicaia's 'Canzoni' are forgotten, his sonnet 'Italia, Italia, o tu cui feo la sorte' is remembered for its genuine patriotism.

On 5 Oct. 1690, in San Pietro a Montorio was held the first meeting of the *Accademia della Arcadia*. The patron saints were Theocritus, Virgil and Sannazzaro, the protecting deity *Gesù Bambino* (the Child Jesus) as a symbol of purity; the emblems were a rustic *zampogna* wreathed with laurel, the constitution a mixture of archaism and affectation, the aim a return to Arcadian simplicity, the means an artificial refinement of both manners and language. 'Arcadia' has had many literary sins laid to its charge, and justly; nothing could be worse than its axiom that nobility of literary composition was to be obtained through imitation; but the follies, puerilities, affectations and dilettantism of Arcadia was a symptom rather than the cause of the current literary corruption. Giambattista Zappi, Eustachio Manfredi and Paolo Rolli are among the less forgotten poets of 'Arcadia' and Carlo Innocenzo Frugoni (1692–1768) the last and most extravagant.

Seicento produced no Italian tragedy worthy of consideration, though the attempts were numberless; usually imitations from the Spanish drama, or founded on some episode of the *Gerusalemme* or the *Orlando*. Giambattista Andreini's 'Adamo' provided some scenes for Milton's 'Paradise Lost.' So, too, the literary comedy chiefly consisted of imitation or translation of Plautus and Terence. Popular comedy (the *Commedia dell' Arte*) extended its success even to the court of France, though of the *Arlecchino, Truffaldino, Brighella* and the extravagant enthusiasm for the charming *Isabella* and *Colombina*, there has nothing come down to us but *scenario*, the plot stripped of the witty impromptu and brilliant dialogue. Initiated by Poliziano's 'Orfeo,' Italian opera was gradually taking form. In 1600 Rinuccini's 'Euridice' set to the music of Peri was received with favor, and was succeeded by Chiabrera's 'Rapimento di Cefalo' with Monteverdi's music.

Justice to this much despised 17th century demands that credit be given to the vigorous writing of the martyr philosopher, Giordano Bruno. A spirit preoccupied by such lofty thoughts could only be eloquent and forceful. The candle he lighted at the stake has continued through the centuries to illumine the lamps of the heirs to his ideals. Tommaso Campanella, another victim of religious obscurantism, paid with 26 years of prison and seven applications of torture for his faith in man's perfectibility through science and the help of wise government, as set forth in his Utopian dream, 'La Città del Sole'; Galileo Galilei (1564–1642), whose wonderful discoveries and miserable fate are familiar, in his famous 'Dialogues' is a master of prose composition. Fra Paolo Sarpi (1552–1623), the champion of Venice and antagonist of papal supremacy, in his 'History of the Council of Trent' presents a remarkable example of well-balanced historical information in pure and noble language.

Il Settecento — 18th Century.

Arcadia — Rinnovamento.

Mannerism, affectation and pretension characterized 17th century Italian literature; the emptiness of the early years of the following century was not less depressing. The Academy of Arcadia loudly proclaimed a return to pastoral simplicity, a reform of manners and literary taste, and a refinement of language. *Gesu Bambino* was the patron, and the Pandean pipe the emblem of the puerile association. Among the few silly sheep who have escaped oblivion are Vincenzo Gravina, Paolo Rolli and Carlo Frugoni. There were, however, a few prose writers worthy to be precursors of the *Rinnovamento*. Ludovico Muratori (1672–1750), in 'Annali d' Italia,' recalls his degenerate countrymen to patriotic ideals, Girolamo Tiraboschi wrote the first complete manual of Italian literature, and the philosopher Giambattista Vico (1668–1744), seems to have had prescience of much that has lately been proved by experimental science.

After the Peace of Aix-la-Chapelle (1748), and the return of the Italian princes to their thrones, ensued an era of social reform and intellectual activity. The influence of French philosophers, especially the scepticism and

humanitarianism of the *Encyclopédie*, spread rapidly in Milan, in the hospitable *Casa Verri*, a group of young and eager intellectuals inaugurated *Il Caffè*, a periodical which from 1764–66 exercised real literary influence, and Cesare Beccaria wrote his great treatise on 'Crime and Punishment,'—*Dei Delitti e delle Pene*. Galiani, Algarotti, Baretti and Gozzi were worthy critics; on the subject of "purism" literary controversy was vehement. The conservative *Accademia della Crusca* opposed the admission of neologisms and foreign words to the language, and proscribed popular phrases; while the revolutionary *Caffè* insisted upon enriching the classical idiom by free foreign borrowings. Melchiorre Cesarotti (1730–1808), in his 'Saggio sulla Filosofia delle Lingue' dictated the theory of this rebellion against linguistic tradition.

Metastasio, Goldoni, Parini, Alfieri, are the great writers of the Italian *settecento*. Pietro Trapassi, known under the hellenized name of Metastasio (1698–1782), was a facile versifier, and understood the human heart. His tragedies are still admired, and his mannerisms and stage arrangements so universally copied that, with slight alteration of names and appearances, his heroes and heroines still strut the stages of Europe. Carlo Goldoni (1707–95), in his 250 plays accomplished for comedy what Metastasio did for melodrama. His faithful presentations of life are seasoned with smiling humor and indulgence and make no attempt at philosophic generalization, pathos or passion, while he represents his corrupt age with a delicacy that is not hypocrisy. He preserves the familiar figures of *Arlecchino, Brighella, Colombina* and the other *maschere*, but gives them new characteristics, and observing the classic unities his plays move rapidly, with few episodes or secondary characters. *Le Carufe ciozote, Pantalon de' Bisognosi* and *Tita Nane* treat every rank of life with equal indulgence, and their serenity, gaiety and winged epigrams still amuse Italian audiences. In the second half of the 18th century the poet Giuseppe Parini (1729–99), preached the new gospel of humanity. In Parini's chief poem, 'Il Giorno,' he satirizes the empty life of a fashionable dandy, whose morning occupation is the toilet; the second part, including the *Giovin Signore's* attendance on his fashionable mistress "*La pudica d' altrui sposa a te cara,*" enlarges the scene.

Alfieri (1749–1803) and the Tragedy.—When Alfieri read 'Plutarch's Lives,' and contrasted that early heroism with the pusillanimity of his own Italy, he shed bitter tears; and resolved to rouse his countrymen to a love of liberty and hatred of tyrants. He chose the theatre platform in order to reach the largest audience. Discarding all secondary personages, all episodical ornament, he surpasses his model, Corneille, in the simplicity of his composition; the dialogue is abrupt, long speeches being reserved for declamation against tyrants and grandiloquent expressions of patriotism. Alfieri's tragedies all consist of contrasts between heroes and tyrants, as Don Carlos against Philip, David against Saul. This eloquent appeal came at the crucial moment, the closing years of the 18th century; it sounded as a resurrection trumpet to the Italian nation, and the dead became alive. Alfieri's writings possess literary qualities, but they are chiefly important for their patriotic purpose and political effect.

Ottocento — 19th Century.
Classic — Romantic — Modern.

The revival of Italian letters was closely associated with those political events of the 19th century which changed a mere *expression géographique* into a great and independent nation. Never in the world's history has the reciprocal influence of literature and political events been greater than during the Italian *Risorgimento*. This literature was both child and parent of the Italian cry for freedom, both product and inspiration of the national revolt; the three periods of national evolution correspond with three phases of literary development. A first period of "classicism" answered to the Napoleonic shadows of glory and dreams of universal empire (1800–20); following close on the disappointment of the Congress of Vienna and the restoration of the Austrian princes to their Italian thrones, the aroused spirit of rebellion assumed the literary form of "romanticism" (1820–59). When the union of Italy was accomplished and reality failed to fulfil the promises of phantasy, came a third period, one of disillusion and depression, of which the literary expression was "realism"; followed finally by the *Terza Italia* in which republicans and neoguelphs became reconciled to the monarchy, and literature found its present natural and national channel. Classic with Carducci, æsthetic with D'Annunzio, religiously mystic with Fogazzaro; with as many divergent tendencies as there are masterful writers to indicate new ideals, Italian literature has become an Art, worthy of the present, promising for the future.

Vincenzo Monti (1754–1828) represents the conflicting tendencies of the first period. 'La Bassvilliana,' written in 1793, echoes the general reprobation of republican violence; 'Ritorno d'Astrea' welcomes even an inglorious peace after the horror of war. Monti gathered honey and perfume from every flower; Shakespeare, Alfieri and the Greeks, suggest the heroic note in his tragedies 'Aristodemo' and 'Caio Gracco'; his 'Bardo della Selva Nera' is imitated from Gray's 'Bard'; and Klopstock's 'Messiad' furnished material for 'Bassvilliana.' But Monti's assimilation and sensibility save his imitations from servility.

Foscolo, Niccolini, Manzoni sang the name of Italy. Their alarum rang out in the silence of a nation's night, they appealed to abstract ideals and aroused some emotion, but Ugo Foscolo's novel 'Ultime Lettere di Jacopo Ortis' awakened the nation. Foscolo's nature was of pure Greek classicism, yet when in this novel he attempted to imitate Goethe's 'Werther,' his production thrills with a romantic passion for liberty. Though classic eloquence inspires the speeches of Jacopo Ortis, the approaching wave of "romanticism" is felt in the sentimental story of the lovers. It was the beginning of the duel between "classicism" and "romanticism," which was continued at Milan between the reviews *La Biblioteca Italiana* and *Il Conciliatore;* the former being paid and controlled by the Austrians to reconcile Italians to their bondage, pretended to defend classicism and the purity of the Italian

language; while in the opposing review *Il Conciliatore,* Pellico, Romagnosi, Melchirrone Gioia and other liberal writers strove to rouse their countrymen to a knowledge of foreign thought and literature. Their battlecry was "romanticism," because romanticism meant rebellion against every literary, religious or political yoke, and opposition to classicism and everything else favored by the Austrian oppressor.

In the midst of this turmoil loomed Giacomo Leopardi (1798–1837). With craving for beauty, love and glory, with seething mentality, soaring imagination; this solitary soul, without faith or the consolations of religion, beats and breaks his wings on the iron bars of his spiritual prison-house. One by one all ideals, all aspirations drop from him; virtue, love, patriotism crumble; a poet's heart is desolate, empty, despairing; each new pang, each bitter disillusion evokes a poem. 'Le Ricordanze' is the mournful story of love unattainable, 'Consalvo' and 'L'Ultimo Canto di Saffo' voice the deepest agony; welcome death is the only refuge from the torments of cruel love. Leopardi does not reproach God, he ignores Him. Brute Nature, *Il bruto Poter che a comun danno impera,* is the enemy. In 'La Ginestra' nature is a perverse will planning the misery of men; 'Canto del Pastore Errante' reveals a darker despair, a deeper penetration of the mystery than does even De Vigny's 'Maison du Berger.' Leopardi's suffering differs from the sentimental romanticism of Manfred, Werther or René; he is essentially classical, his vision of beauty has the simple outline, the grace of Greek statues. What antique elegance and serenity are in 'La Quiete dopo la tempesta,' 'Il Sabato del Vil'aggio.' Because of this truly Italian classicism and introspection Leopardi's fame survives as the founder of the school made illustrious by Carducci.

Alessandro Manzoni (1785–1873) wrote two tragedies, 'Carmagnola' and 'Adelchi,' admired for their resounding verse; and his 'Inni Sacri' are true hymns of Christian faith; but Manzoni's fame is founded on his novel 'I Promessi Sposi' ('The Betrothed'), which is the only great novel of the Italian romantic school. 'I Promessi Sposi' is a faithful mirror of the moment, though modern Italians dislike to admit that the passive endurance of oppression there described truly represents the national spirit of that period. It is a simple story of love, with homely figures and characteristic types, round which is constructed a large and life-like historic picture. Once every novelist was a Manzonian. Grossi accepted the master's guidance, D'Azeglio his advice. Romagnósi, the deepest sociologist of his time, and Rosmini, the opponent of Jesuitism, and many poets, novelists and philosophers formed the Milanese literary group of which Manzoni was the centre.

Manzoni and Ippolito Nievo will always be contrasted, as will 'I Promissi Sposi,' and 'Le Confessioni d'un Ottuagenario' ('The Memoirs of a Man of Eighty'). These novels are the beginning and end of the romantic period. Manzoni lived to see his romance an abounding success, Nievo died before his was published. The very name Ippolito Nievo is an evocation of the romantic, rebellious, heroic Italy of which he writes. Like a hero of some legend, Nievo uttered a cry, wielded a sword, loved and was loved, and then in words vibrating with passion, pathos and sincerity he created a marvelous picture of his period, a wonderful presentation of the double evolution of himself and of his Italy. Nievo's life, his novel, his country, each explains the other.

The romantic tragedy was attempted by Giovan Battista Niccolini. His 'Arnaldo da Brescia' is an epic of symbols ringing with war trumpets, rather than a play. Italy is here represented by Arnaldo, the papal power by Pope Adrian, and imperial tyranny by Federigo III. Patriotism also inspires the poetry of Berchet, Giusti, Carlo Porta and Poerio. Gioacchino Belli (1791–1863) is a master of humorous and patriotic poetry; his sonnets sound the inextinguishable laughter of the Roman people; the tavern and street corner, the priest and Pope, the mendicant and parasite all pass by, as he unrolls his panorama; it is Life,—Roman life. The poetry of Giovanni Prati and Aleardo Aleardi fanned a flickering flame into the dying embers of romanticism, Giacomo Zanella was applauded for his short poem 'Sopra una conchiglia fossile;' but soon these pale stars were extinguished by the rising sun of Carducci's classic splendor; and romanticism fled from Italian literature when Nationalism, the patriotic purpose which inspired it, was attained. Though true as representing a psychic moment, "romanticism" was false as a representation of Italian temperament.

Third Period.—After the occupation of Rome as the capital of Italy (1870) — fulfilment of hope long deferred,— Italians faced many discouraging political, social and financial problems incident to the amalgamation of many petty states into one united kingdom. Literature reflected this moment of peculiar perplexity. In Giosuè Carducci *Terza Italia* found its voice; his soul was the soul of the people, his genius the genius of his race; the classicism, earnestness, patriotism of his poetry, are those of the complete and complex *Italiano;* 'Juvenilia' is purely classic, 'Levia Gravia' is not free from foreign reminiscence, in 'Decennalia' and 'Giambi ed Epodi' are the impulses of Juvenal, the grandiloquence of Hugo; 'Rime Nuove' is the greatest poetry of modern Italy, and is composed in every variety of metre; 'Odi Barbare,' so-called on account of their pseudo-classic metre, are classic reconstructions; 'Ça ira' is an approach to a modern epic. Always Carducci adores Italy; his landscape, his characters, are purely Italian. What beauty in *Maria Bionda* whose smile is like the sunbeam of *April novo* on fields pied with flowers! How far from "Arcadian" mannerism and frisky lambs, is the life of the Maremma (*Idillio Maremmano*) plentiful in primæval plowing, with young men lustful and brave, vaulting on wild horses!

While poetry flamed, prose literature plodded. Paolo Ferrari and Achille Torelli wrote popular plays and Giuseppe Giacosa held the boards for 30 years. His plays 'La Partita a scacchi' and 'Il Conte Rosso' pleased Italian audiences and 'Come le foglie' and 'Il Più Forte' display feeling, and perception of the

Italian problem of a sceptic nation with an ancient civilization and an outworn faith, facing modern civilization. Pasquale Villari's authoritative histories, 'La Storia di Girolamo Savonarola e dei suoi tempi,' 'Niccolò Michiavelli,' and 'I primi due secoli della Storia di Firenze,' are not less known through English translation than in Italian; they are a part of the best Italian literature of the century.

The Novel.— The last Manzonians and some close imitators of the French were issuing a few scarcely read novels when the dispute about "realism" aroused attention and stimulated writers. Zola's claim of having lighted a new lamp was not questioned; yet Italian literature in every age has shown a direct observation of life. What more realistic than some passages in Dante, Boccaccio and Ariosto? Except for the first few imitations from the French, Italian realism,— or "naturalism," as they call it, developed in a purely Italian manner. Individualism is the keynote of the Italian character, and is reflected in that mirror of society, fiction. Love, to the Italian, is the effect of physical sensation, though this often afterward develops into a sentiment. In Rovetta's novel 'Mater Dolorosa,' Lalla loves her husband, yet accepts a lover; Serao's *Ballerina* is the slave of desire for a man who has never mentioned love to her; Neera's maidens are all swayed by physical sensation; Fogazzaro's 'Daniele Cortis' is almost the only successful Italian novel in which love is conquered by duty.

Giovanni Verga and Luigi Capuana were the first champions of the realistic Italian novel. Verga's representations of simple semi-civilized Sicily are truly Italian. De Roberto, a follower of Verga, has traced an historic picture of Sicilian life. Matilde Serao, after attempting the sentimental novel and the Zolian methods of observation, has successfully blended these two fictional elements in 'Suor Giovanna della Croce.' Enrico Butti has given remarkable studies of the modern conscience. Antonio Fogazzaro's novels are an honor to Italy, they unite realistic observation and spiritual insight. Gerolamo Rovetta faithfully represents a society lacking in noble ideals; his characters are as often sordid as wicked. Salvatore Farina is optimistic, Grazia Deledda feelingly describes her own Sardinia, and De Amicis presents familiar scenes of soldier life and street-car episodes.

In the beginning of the 20th century Gabriele D'Annunzio occupies the first position among Italian writers. He is the most widely read and the most imitated, and he has made incursions into almost every form of literary composition. In his lyric poetry bright images and harmonious rhythm partly conceal the coldness; adopting Greek elements in his tragedies, a vague theory of heredity replaces classic fatality, and the undaunted will is substituted for heroic virtue. But D'Annunzio the complex, refined, egoist and sceptic, cannot grasp the grandiose simplicity of antiquity,— the transcendental self-abnegation which is the finality of tragic art. The pathos of *Mila di Codrio*, the sentiment of *Francesca*, even the devotion of *Maria Vesta* are tainted with artificiality.

The immorality and cruel individualism of D'Annunzio are less repugnant when read in his novels than when spoken in his plays. 'Piacere' is a prose poem to the goddess Aphrodite. 'Il Trionfo della Morte' is D'Annunzio's greatest novel. What reintegration of life in symbols, what evocations of beauty! Yet what emptiness! What half-truths! Half-truths presented with beauty, harmony and *volupté* in gorgeous golden pictures. 'Le Vergini delle Rocce' is dream-stuff, impersonations of virtues; the castle, the landscape, the glory of spring-blossoming, the symphony of water, the grandeur of majestic hills, the splendor of sunsets! It is a new species of literary composition. 'Fuoco' is also a dream of beauty. Venice has never been sung with more complete comprehension of her seduction. D'Annunzio is the apostle of the pagan interpretation of life and beauty. He satisfies the Italian craving for elegance of style and purity of language. But he gives a false impression of life; he generalizes from accidentals; though he is keenly alive to the lesser sensations, he is ignorant of the majesty of the human soul, and his glittering phrases contain no solution of life's great problems.

Satisfactory criticism by the Anglo-Saxon of Italian literature is difficult, the viewpoints, both moral and æsthetic, being so different. In the Italian psychology there is much latent paganism. This is evidenced in the persistence of classicism in literature; it accounts for the popularity of D'Annunzio. In Italy it is often asserted that the national literary development tends toward a return to *Cinquecento* ideals, the ideal of the artist careful only for the precepts of his own art. But since no nation does ever return to a previous state, and since those predominant factors of modern literature, the novel and the drama, must inevitably reflect the nation's life and be occupied with the themes which appeal to the national conscience, Italian literature will doubtless give increasing attention to social and economic conditions and the relations of the individual to society. Writers on these subjects will seek for a philosophy of life and emphasize rather the emotion of ideas than the emotion of sentiment. For others, like Fogazzaro, the soul of man will be the arena of supreme strife, and the law of the soul, the relentless despotism of conscience, the subject of supreme interest; while still others, of the D'Annunzio school, will insist on the "humanist" ideal of "Art for Art's sake," and find in Joy, Art and Beauty, the "fullness of life," and the subjects for literature.

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23. ART IN ANCIENT ITALY. Italy's geographical situation extending from north to south and reaching far into the Mediterranean Sea nearly midway between its eastern and western extremities, open on all sides to the migrations of peoples and the activities of commerce, has from the earliest times subjected her to the influence of the civilizations of the various "Peoples of the Sea," Phœnicians, Egyptians, Etruscans, Greeks, the inhabitants of the Balkan Peninsula, and even the teeming life of the Orient. Indeed it was the movement of this Oriental civilization westward which retarded the progress of Italy in art as compared with Greece. Nevertheless some of the primitive Italian peoples developed peculiar artistic manifestations worthy of consideration.

There was no true art in the Paleolithic Age, although some primitive Italian manufactures reveal a certain æsthetic sentiment for form and considerable skill in the making. Liguria, the Valley of the Vibrata and the island of Capri, are the chief Italian districts where are found relics of human industry of the Paleolithic Age, but these scanty remains do not permit of the minute classification which is possible for the same periods in France.

The Neolithic period was more productive. Its remains are similar almost everywhere in Italy and in its objective manifestations it does not differ from the character which this period of civilization presents in the rest of Europe. In architecture we have not immense megalithic constructions as in England and France; perhaps because the civilization of the Neolithic Age was not prevalent in Italy at the time in which these megalithic constructions were in vogue. Notwithstanding this, there are dolmens in the province of Otranto; the caves of Liguria are full of neolithic remains; and the islands preserved for a long period the remains of the population and the civilization of the Neolithic period, and especially of the latter phases of that civilization what is called cupro- or æneolithic.

Throughout Italy may be found weapons of elegant form both in stone and in copper. Ceramics attained to artistic forms more than any other manufacture, as in the bell-shaped cups and bowls decorated with ornaments crudely cut with a knife, or stamped with wormlike designs, and then filled with a coloring matter; the decorative element is always geometrical. The most beautiful works in neolithic ceramics are found among the insular populations, the Sicilians and the Sardinians, who had for a longer time tried to develop their civilization. Even their architecture made noteworthy advances in this period, perhaps through the influence of the Orient. We do not know if the dwellings of the living had already assumed artistic forms, although the ceilings of the dwellings in the neolithic and æneolithic ages indicate great progress in roof construction; they were circular or oval and partly sunk and covered with a kind of cupola. The artificial crematory vaults of Sicily are complicated systems of tombs, which may be compared with the Oriental *tholoi;* the *nuraghi,* the *domus de gianas,* etc., of Sardinia, similar to the megalithic constructions of the Balearic Isles, or of Malta, and of Pantelleria, are an ulterior and characteristic development of the monuments of neolithic civilization; there is an Oriental suggestion in the cupolas, the rare spiral decorations, and in some exceptional instances of fortified walls, or of encorbellement.

In Sicily (probably owing to Ægeo-Oriental influences), the development of a ceramic art is to be noted which in the subsequent period substituted painting in place of incised decoration, with the richness of polychrome ornaments.

In regard to architecture, the new people of roving habits, accustomed to living in marshy plains or on the lakes, brought with them a knowledge of building which was better adapted for buildings of wood than of stone. The palisades and the "terremare" of Lombardy, which are but the continuation of these, are constructed on strict principles of exactitude, defense and permanence, which we find later in the Etruscan cities (for instance Marzabotto), or in the entrenched Roman camps. Indeed, it is even a matter of doubt with some whether the architectural portions of the *terremare* should be attributed to these primitive people at all, and not rather to the subsequent Roman buildings. The fact is that the rude manner of life and the low development of the arts do not well accord with such a perfect system of land surveying. The ceramics of these people are of course an imperfect paste, of a dark color, for the most part not well molded, scantily decorated, generally with protuberances or applied ornaments, more rarely with engraven or stamped designs.

The bronzes, on the other hand, show more advanced artistic forms; daggers, lances, arrows and personal ornaments in molten bronze, among which at length appears the fibula, or brooch, while there may still be found ornaments of bone, ivory, amber and other natural substances (shells, teeth), or artificial substances, imported glass compositions, etc.

Whilst in the Ægean Archipelago and in Greece the civilization called Mycenean flourished, in the third and second thousand years

before Christ, there was in the Mediterranean basin a continual coming and going and mingling of people in active commercee. During this period must have been formed the principal nuclei of Italian populations that figured in the dawn of history. A great part of northern and central Italy was occupied by the Umbri; the central east and the south by Osco-Sabine populations; in Liguria, in the islands and the extreme southern portion there survived primitive stocks such as the Liguri, the Siculi, early Sicilians and the Sardinian and the Messapii. In the upper eastern corner the Illyrian migrations continued which gave rise to the civilization of the Veneti; then in the central part, on the Mediterranean or Tyrrhenian side, there arose the splendid power of the Etruscans; while, later, there descended from the Alps the Celts, and Greek colonies invaded the South.

Each of these peoples for a time held a certain supremacy over considerable territory and represented a certain phase of Italian art and civilization. The most splendid and most characteristic phase of the Iron Age in upper Italy is that found in the Felsinean (or Bolognese) territory corresponding to that on the other side of the Alps called *Halstatt* civilization.

The incinerating tombs in the last period are ornamented with *stelai*, or narrow slender slabs of sculptured stone above the surface of the ground. The metallic ornaments and bronze weapons are partly of molten work, some filed, some in relief and some carved and engraved.

The ornamental designs are evidently inspired by the geometric forms of contemporaneous Hellenic civilization. With the progress of Mycenean decoration we have the gyrate, the wolf's tooth and the double spiral.

The broadsword belts of laminated bronze are beautiful; the swords with hilt in form of antennæ; the poniards, etc.

Almost contemporaneous was the civilization of Venetia. The shapes of the vases are various; their characteristic decorations are first the bright stripes of red and black, then the impressions, then the incrustations of metal bosses. Great is the variety and richness of the pendants, tassels and amulets: sometimes fantastic animals double-bodied, in evident geometric style. Later appear the laced garments, and the famous *situlæ*, finely worked in relief in long circles representing living scenes, festivals, hunting parties or simply animals running, as on the Corinthian vases.

In central and southern Italy. "Umbria," the people who dwelt there in the first Iron Age were represented in the industrial age by similar forms, which had no time to develop as did those of Bologna, because of the super-imposed Etruscan work. On the Adriatic side of the water-shed, the more ancient ethnical foundation prevailed, and the Illyrian influence made itself felt; on the Mediterranean side, before the Etruscan invasion, the civilization of the Osci, the Sabini, the Falisci and the Latini was more simple, as is manifested in the remains of the Alban necropolis and of Campania.

In the south of Italy, before the Greek colonizations, there was an extended Italian civilization; but it fused with Sicilian elements which always predominate. In the extreme eastern limb, the Sallentine peninsula, we find among the Messapii survivals of a local civilization which developed under the Mycenean influence. Characteristic, for instance, is the ceramic art which lasted until a late epoch with forms of a *conca*, or water vessel, of *trozzelle*, and with vivacious bright-colored painting, of which the elements are partly geometric, partly floral forms. It was at exactly this period that in Sicilian ceramics polychrome art found its widest and most varied application.

Another element of Italian art which started in the south and extended to central Italy is the civil and military architecture. In Lucania we find more rustic, and perhaps more ancient, instances of these constructions called Cyclopean or Pelasgic, which are found in a more perfect or earlier phase in central Italy. Here are also found walls of support for terraces, such as the Cretan, streets, sustained on sloping sides, bridges, *hierons*, altars, or central temples, etc.

Exhaustive researches are still necessary to settle finally the disputes as to the antiquity and origin of these constructions. There are three hypotheses: either they derive their origin from the megalithic constructions of the Neolithic Age, or are an importation of the Ægeo-Mycenean architecture, or are an imitation of the Hellenic fortifications of later times.

Central Italy was soon made to feel the influence of a remarkable people who, inhabiting a beautiful country, were endowed to an unusual degree with a love of life and the artistic spirit.

The Etruscans present a problem in the history of ancient Italy which the unwearying efforts of learned men of two centuries and vast and profound excavations have not yet been able to solve. Apparently the better theory, however, considers the Etruscans a people differing from the other Italian races, as immigrants perhaps from Asia Minor. All students agree that the ancient inhabitants of Tuscany developed on Italian soil a peculiar form of civilization in which art had a great field of expansion and which exercised a powerful influence on the neighboring or subject peoples. At the end of the 10th century B.C., or before that, we find in Etruria new forms in architecture and in the industries, which are the most ancient arts.

Civil and military architecture in Etruria was displayed in the fortified cities, where they had not the structure and the archaic forms of the so-called Pelasgic cities, although the same roof construction prevailed. The most ancient instances are those of Rusellæ, Cosa and Fiesole; at Populonia we find the intermediate phase and at Volterra and Cortona the more progressive form.

In architecture, and especially in sepulchral architecture, there are remarkable survivals of Mycenean types. The decorations of the gate of Felsina with two heraldic animals facing each other has a parallel in the Gate of Lions at Mycene, and true and regular *tholoi*, or circular buildings, such as the sepulchral chambers of the Tumulus of Petriera near Vetulonia, and the tomb of Cuma, recall as do some others the barbican vaults in the celebrated treasuries of Mycene. Still more characteristic bee-hive forms are seen in the ancient Tullianum at Rome and ogival sections of the fountain at Tusculum, which recall the Mycenean roof structure. Later on, as in Greece, the sepulchral vault was more commonly in rectangular

form with sloping roofs, copied from the houses, of which we have effigies on several urns and sarcophagi.

One of the merits of Etruscan architecture is, that it developed curved lines in roofs, following a principle of Oriental architecture, that is to say, the invention of the arch and the dome formed by wedge-shaped pieces of the building material converging toward a common centre.

The most ancient examples, however, do not appear to go farther back than the 6th or 7th century B.C., as for instance the so-called tomb of Pythagoras, near Cortona.

On these principles the Etruscans were able to build roads, bridges, subterranean tunnels for drainage or aqueducts, and to build gates in their cities of enormous size, as, for instance, that of Volterra or the later one of Perugia.

As regards the edifices, we must suppose that the early wooden structures continued until considerably later times and we see imitations of them also in stone, as in the section of a tomb of Corneto. Through maritime commerce with the Orient and Greece, the Etruscan architecture developed on Greco-Ionic models, of which the Tuscan style affords an example.

Recent discoveries prove that even in more modern buildings the foundations were constructed after the Mycenean pattern. The excavations at Marzabotto show the plant of the Etruscan cities. The city faces east and west; its two principal streets, the *Kardo* and *Decumanus*, formed a cross; in the centre of the cross is the *Templum*, and the four principal gates are at the extremities of these two cross streets. The Etruscan temple was rectangular upon a high base, sometimes a simple cell with *pronaos* or portico in front of the cella, but more often with three alcoves for the three idols, Jove, Juno and Minerva.

The form of the Italic and Etruscan dwelling differs from the Greek dwelling, is Oriental in its origin, and was brought into Italy by the Etruscans. This is the origin of the Roman *domus*, though so modified that the primitive form is almost unrecognizable.

In Etruria, plaster was used chiefly for the ornamentation of edifices, especially of temples, in which terra-cotta ornamental designs in different colors were applied. But whether owing to the lack of a material suitable for sculpture, such as marble, whether through the practice gained in this decorative sculpture, coroplastic made great progress in Italy, as we see in the written traditions which celebrate, for instance, Damophilos and Gorgasos, the decorators of the temple of Ceres, and in the museums where it figures as the principal art of the Etruscans. Remarkable examples of the archaic period are the sarcophagi in the Louvre, the British Museum, and the Museum of the Villa Giulia in Rome, and the Ionic decoration discovered in recent times on the face of the temples of Luni, of Falerii and of Arcevia.

Modelling gave the Etruscans special opportunity to practise the art of portraiture. Naturalism, sometimes carried to caricature, may be seen on some of the most ancient, on the cineraria busts, called *canopi*, such as those of Chiusi. The Tyrrhenian sculptors knew how to trace accurately physiognomical traits; they were the true creators of the art of drawing from nature, which we find later in Roman art, and renewed again in the *Renaissance* in the works of Donatello, in Etruscan ground. The *Ius imaginum* in the noble families encouraged this characteristic side of Italian art, but the true incentive was in the peculiar disposition of the Etruscan stock.

Next to coroplastic, but more rare, is the sculpture in soft stone, clay, rotten stone, *nenfro* and *peperino;* which acquired a more dignified aspect by means of plaster and colors. In time these materials were also substituted for wood in the construction of more important buildings.

Painting was also extensively used by the Etruscans. The immoderate luxury of their life and the special care devoted to the dwellings of the dead caused them to place their tablets inside the tombs, concealed from public sight. From this it is argued that painting was also frequently used to decorate public and private buildings, of which no remains have been preserved.

The most ancient examples of mural painting are found in the tombs of Veii, depicting animals of Oriental form, and in the slabs of Cære in the Louvre, with scenes relating to the religious ceremonials of the dead.

The richest and most varied sepulchral paintings of the beginning of the 6th century are found to-day in the necropolis of Corneto (Tarquinia), and at Orvieto (Volsinii), and Cervetri (Cære). The favorite subjects are those which, while representing material joys of life, as well as the basest and most cruel, seek to enliven the Elysium of the dead, perhaps with scenes of funeral ceremonials or historical events or the terrible scenes of Inferno, peopled with demons, evident prototypes of the Tuscan religious paintings of the Middle Ages. These paintings reveal the influence of Greek art, especially of Ionic art; the imported vessels (cups, bowls, etc.) served as an inspiration to the local artists, but the sentiment expressed in the subjects, full of mystery and ferocity, and the heavy and vulgar style of the faces are sufficient to reveal the different character of the Etruscans.

The Etrusci tried also to imitate the beautiful ceramics which were brought from the best Greek manufactories; but it is hard to say how far they succeeded. They rather became specialists in the manufacture of the *bucchero*, a dark pottery for funeral uses. Certain copies of metal house utensils derived from the Italic clay paste, but perfected on Greco-Oriental models, soon became an Etruscan specialty, and in later times acquired the delicacy and lightness which is lacking in the more ancient type.

They were recognized as masters in the fusion of metal, even by the ancient Greeks. They executed a great number of works of industrial art, rising even to great sculptures, as in the Capitoline Wolf at Rome, the *Arringatore* of Florence and other statues and statuettes scattered about in the different museums.

They were unsurpassed artists in the working of gold. It seems as though they had inherited from all the ancient people their special arts: from the Ægeans, filigree work and granulated work and glyptics; from the Egyptians and the Phœnicians, enameling and glass compositions (pastes); from the Syrians and

other Asiatics, molding and carving; from the Ionians, the ornamental designing of fantastic flora and fauna, already reduced to decorative use; from widely separated sources the arts of blending different woods, of soldering metals and of wood carving.

From the most remote times we find in the Etruscan tombs ornaments of Oriental character, finely worked in gold, electron, silver, etc., mostly fibulas, belt clasps, necklaces, etc., as at Vetulonia, Cære, Præneste, Cuma, about which there has been much discussion; some archæologists maintaining that they are of Greco-Ionian or Phœnician manufacture; others, that they are of local art. This last opinion seems now to be the most trustworthy. Later we find, especially in southern Etruria, chests decorated with the finest engraving, an art which became localized through the Latini of Præneste, a technical art which was greatly employed in the manufacture of mirrors and which succeeded in imitating the celebrated Phœnician drinking cups.

In all the industrial arts the Etruscans excelled. The few remains we have of carved ivory show a perfect knowledge of intaglio. They were less happy in the manufacture of money, which they learned probably from the Greek colonies of southern Italy.

Altogether, the Etruscans were a people eminently gifted with the artistic sense; they had the merit, through their conquests, by which they dominated a great part of Italy; or through their commerce, of diffusing also this branch of their civilization, the further historical civilization of Italy, upon which was laid the foundation of the Roman power that conquered the world.

The Etruscans had as competitors for the domination of Southern Italy, the Greeks, and as rivals in commerce the Phœnicians, especially those of Carthage. But these had no standing in other countries but a commercial one; their influence was not that of colonizers. A people that is essentially practical, and with precise ideals, can never have a true and individual art of its own. Hence the Phœnician influence in art in Italy is quite inconsiderable, in spite of some of its special manifestations in the colonies of Sardinia (as in Nora), and of Sicily (for instance, Eryx, with its walls). Besides this, the Italian spirit and the Etruscan were profoundly diverse, and agree only in anti-semitism.

The Greeks, on the other hand, who colonized Sicily and the extreme lower part of Italy in the 8th century, and who also had perhaps a commercial influence, if they were not true colonists in the earlier times, entered as the principal factors into the classical civilization of Italy, investing the Etrusco-Italian civilization with elegance and refinement of form, without changing the substance.

We must remember that in one period of Greek history, *Magna Grecia* found itself in a more flourishing condition than continental Greece, and that artists found in the west a better field for the exercise of their art than in their own country. The principal Greek colonies in Italy were of Doric or partly Doric origin; hence Peloponnesian art was readily diffused in Italy. The Doric temples of Segeste, of Selinunte and of Posidonia, of the 6th century, recall those of Olympia and Egina.

Sicilian sculpture is similar to the works of Olympia; is seen also perhaps in the less archaic metopes of Selinunte, resembling the works of Kritios, and the acroterii (Ionian) of Locri.

The numismatic art of the Syracusans was unexcelled, and their coins stamped with the signature of Euainetos are the most beautiful specimens ever executed, even when compared with those made in Greece itself.

Tarentum was not only the commercial but the artistic centre. There are said to have existed manufactories for bronze molding, for gold work and for ceramics, the products of which are found all over Italy. One of the most singular manifestations of Greek art on Italian soil is ceramics. This western ceramic art differed from that of Greece, as well in a freer, clearer design, in a greater richness of coloring and greater size, suitable to a barbarous style. The subjects, even the mythological ones, deal chiefly with funeral ceremonies, for which they were exclusively destined.

Meanwhile the power of Rome increased, and its dominion extended, and in it was gradually concentrated all the Italian spirit, laying the foundation of its various elements. Rome, originating in small Italian beginnings, had soon received with Etruscan domination the spark of civilization and prepared itself now to absorb Hellenism. The outcome of this was the classic western civilization, the civilization of Rome.

Early art in Rome was essentially Etruscan. That is shown by historical tradition and by the earliest, most archaic, monuments. Let us take, for instance, the tomb of Romulus in the Roman forum, the temple of Jupiter Capitolinus, etc. The mural paintings of the Esquilines preserve the Etruscan character, although of more recent date (2d century). They belong to the historical class, and in this class, to be exact, we must place the works recorded by tradition, naming as artists Fabius "the Painter," Pacuvius, M. Plautius, Lycon, etc.

The monuments of the period of the republic partake of this Etruscan character with Greek habiliments; such are the constructions in clay, whether they are fortified walls, in isodoma work, where the vertical joints of one course of stone are immediately over the centre of the blocks in the course below (Rome, Ardea, Tusculum, Satricum, etc.), or whether they are the most archaic temples of peperino ornamented with polychrome stucco work (temple of Victory on the Palatine Hill). The very city of Pompeii, the best preserved of Latin times, has a foundation of Etruscan characteristics, later Hellenized.

In architecture the Romans made great use of curves and of arches, which they learned to construct from the Etruscans, and they employed these forms in the most ingenious ways such as in the long line of aqueducts, the bold bridges, the triumphal arches, the super-imposing of several tiers of arcades, in which people pretend to trace the Hellenic influence, even to the cupolas, among which the vault of the Pantheon, reconstructed by Hadrian, is conspicuous for its amplitude and solidity.

Toward the end of the republic and at the beginning of the empire, there were introduced into Roman architecture, together with diverse materials, different artistic forms.

Bricks of solid clay, well shaped and of regu-

lar form, small dice of tufa, or simple chips and splinters of flint pebbles, were collected into a solid mortar with chalk and *pozzolana* (a ferruginous stone from the volcanoes of Latium or Campania). The solidity of this material allowed of new constructions, especially the crossed arches and ample arcades. As regards architectural ornamentation, the Romans, besides the Tuscan, and the three Greek styles (with preference for the Corinthian), made use of a new style of architecture, the Composite, which was the outcome of the blending of the Ionic with the Corinthian.

In plastic art, the Romans soon became the servants of the Greeks, whose admirable works obscured the rude local sculpture. Only in portraits did the former maintain, until the time of the decadence, the value of nature. Sculpture at the time of Augustus tried to imitate the best models of Attic art; the most perfect of the monuments built in the Golden Age of Rome was the Ara Pacis, the culminating symbol of Roman civilization. And into historical reliefs, inspired, it may be, by Hellenic models, they knew how to put fresh life, as is shown in the reliefs on the triumphal arches of Claudius, Titus, Trajan and Marcus Aurelius and in the admirable sculptured recital of the Dacian wars, which surround the column of Trajan like a *scitala*, copied afterward in the column of Marcus Aurelius. The Roman consuls, in their war booty, and the pro-consuls and the administrators of the provinces, enriched the country with true works of original art, despoiling Greece and the Orient. What they could not steal was copied and the copies were made with the fidelity of perfected mechanical methods. The passion for collecting art works prevailed among private persons, and Greek artists came to Italy to establish their studios, attracted by this mania of the rich Romans.

The artists of the family of Polykles were called by Metellus; Apollodorus, Apollonius, Glycon, Cleomenes, Antiochus are names of artists that may be read on famous statues in the Italian museums, such as the Torso of Belvedere, the Farnese Hercules. Avianus Evander was a celebrated sculptor in the service of Antonius, etc.

Pasiteles was the founder of a school which flourished in the latter days of the Roman republic and the first of the empire; a school without originality, and which, following the archaistic fashion of the times, copied and adapted earlier models and composed untruthful work. Among the products of this school are the "Orestes and Electra" of Menclaus, in the Ludovisi Gallery, the "Orestes and Pylades" in the Louvre and other "Orestes and Electra" at Naples.

Nero, Hadrian, Marcus Aurelius, Heliogabalus, Alexander Severus, were true and real artists; Hadrian left us a work of architecture, the temple of Venus in Rome, while the Greek, Apollodorus, architect and sculptor, created the admirable works which commemorate the glories of Trajan.

To the architects and sculptors of Imperial Rome, the decoration of the rich tombs, which extended for many miles beyond the gates of the city, was a fruitful field. All the most varied forms of mausoleums found a place there, from the modest sepulchral to the altar-tomb, and from the sarcophagus to the colossal tumulus richly ornamented, as for example the archaic tomb near Albano, still of Etruscan type, and the sepulchre of Cæcilia Metella on the Appian Way, of the latter days of the republic.

The Italian form of the tumulus, erected on a circular base, still prevailed; but the treatment was Hellenized. The Imperial tombs of Augustus and Hadrian still preserve that form as a foundation, while in the architectural adornment they are inspired by Hellenic monuments, such as the mausoleum of Arsinoe in Samothrace. But there are not lacking imported, or purely Hellenic forms; shafts, *ædiculæ*, little temples, or perhaps exotics like the Egyptian pyramid of Caius Cestius, or the turreted tombs with steps, as if several buildings were placed one on the other; as, for instance, that of the Julians at S. Remy and that of the Secundini at Trèves.

Roman painting of the more prosperous times remains only on mural decorations, and it is easy to form an idea of what the easel paintings and those in the technical art of encaustic were like. If one may be permitted to form a conception by the reproductions of paintings large and small in fresco on the walls, by portraits like the mummies of Faijum, and if the "Muse of Cortona" were not a mere Renaissance imitation, it is certain that Roman art was not less advanced than Hellenic art. But it was just this resemblance to Hellenic art which deprived the Roman paintings of originality, unless it be that the works of a national art parallel with that of historic sculpture have been lost.

Decorative painting may be studied in the few examples that have survived in Rome (the house of Livia, the auditorium of Mæcenas, the thermae of Titus), and in the much-visited examples in the houses of Pompeii, but they are provincial art. Similarly with painting, mosaic and stucco decoration developed (as in the so-called Farnesina house, the tombs of the Latin Way, etc.). Besides this, the artists of the Renaissance preserved sketches and designs of mural paintings, since destroyed, and it was from this art that the school of Raphael drew inspiration in its "grottesche."

It has been possible to reconstruct the historical development of this Roman art. The works of the first period resembled marble designs; the second period developed an architectural style with effects of perspective; the third, a richer style with portraits interspersed; the fourth was ornamental and overladen with fantastic architecture, with scenes painted according to nature, alternating with copies of the most celebrated antique painting, sometimes most archaic. The prototypes of this pictorial decoration of the Hellenic epoch exist, or may be sought, in the islands of the Ægean Sea, in Asia Minor and Alexandria.

Mosaic and the *opus sectile*, or colored marble inlaid work, were also of Oriental origin. In the most ancient mosaics with large tiles or stones and few colors, the motives are simple; divided into mythological figures, animals and fishes. Then there were represented, in a greater variety of colors, fishes and other animals, little tables covered with the remains of the meal, until with a more refined technique

(*opus vermiculatum*) they made regular and true pictures, hunting scenes, as in the great mosaics of Præneste, and gladiatorial scenes, as in the mosaics of the Thermæ of Caracalla, and contests in the arena, etc., and even such elaborate pictures as the battle of the Issus, found in the house of the Satyr (Faun) at Pompeii, and now in the Naples Museum.

In industrial arts the Romans, especially in the provinces, obtained fresh results. In the history of Italian ceramics, the production of types derived from the Greek ceased with the Calenian manufactories, and in Etruria arose the manufacture of vases and the plastic ornamental work of Orvieto, then the delicate cups of Arretium, made of the finest clay, sometimes silvered and gilt, in the work of the Alexandrian *toreutic*. The names of these manufacturers are known: The celebrated Canuleius, Gabinius and Attilius and Popilius Attius, and it is supposed that these vessels were not imitated directly from the gold and silver vases, but from cups in relief of Megara. The glass industry, which throve principally in Cisalpine Gaul, blown and colored, or turned on a wheel in the style of glyptics as in the *murrinæ* cups, and the *vasa diatreta*, or even in the style of cameos, little by little supplanted terra-cotta for table use. Also the vessels made of precious metal kept alive the traditions of Alexandrian art, and we have an example of it in the rich silver furniture of *Boscoreale*.

In glyptics, the Romans continued the traditions of Greece and especially the Hellenistic traditions in the great historical cameos. In the art of working in gold they remained inferior to the Etruscans, although they surpassed them in artistic designs inspired by the Greek models.

What the art of the cabinet maker was able to produce in Roman times is found in the scarce specimens of furniture, inlaid with ebony and ivory, and encrusted with metal and precious stones, engraved or in relief. It is worth while here to recall the beds (in the Palazzo dei Conservatori at Rome, in the museum at Naples, and in the Kircherian Museum), the litters (in the palace of the Conservatori), the *tensa Capitolina*, and the ivory beds of Ancona.

The weapons of war also present rich decorations, especially those for parade, the Imperial arms (the sword of Tiberius), or the gladiatorial weapons (Naples).

The limits of this article do not permit consideration of the arts of calligraphy and miniature, so richly developed in the Middle Ages, as seen in the beautiful codices of Virgil in the Vatican, and of Terence, and the Iliad of Milan; the classic age did not lack the taste for art in books, which is shown in the beautiful shape of their characters, as well as in the scenes which illustrate their books. To the Romans belong, above all the classical nations, the merit of giving an artistic shape to the letters of the alphabet.

But the very power of Rome which extended itself over a great portion of the known world was the cause of her decadence. Whilst the new classical civilization diffused itself beneficially in barbarous countries and art in these places assumed a provincial character, Rome absorbed fresh ethnical elements, and with these the germs of artistic decadence.

The mania for obtaining grandeur through hugeness, richness through a plethora of ornamentation, was the cause of this decay. The baroque style was the sign of a similar artistic decline in more modern times.

In the public edifices there was already to be noticed this exaggeration: If, for instance, one stood before the forum of Cæsar, and the forum of Augustus which surrounds the beautiful temple of *Mars Ultor* and the forum of Vespasian and the so-called forum of Nerva, in which is seen the most refined minuteness of ornamentation, proper in the second style of the 1st century, and then before the immense forum of Trajan, an admirable group of edifices, worthy centre of a capital of about a million inhabitants, one would see already in the Golden Age the tendency to excessive immensity. And it is still more instructive to compare the Thermæ of Agrippa and of Titus, elegant and moderate in size, with the enormous constructions of Caracalla and Diocletian, where the amplitude of the arches becomes gigantic, and the incrustations of colored marble give the whole an Oriental polychrome character.

The Orient, that land of the origins of civilization, has disburdened many times on the young West the ardor, the softness, the exuberance of its thousand years of civilization.

Plastic decorative art had a similar course. Compare reliefs on the arches of Titus and Trajan, which latter with its three arches shows an amplification of the pure Roman arch of the Golden Age, with the superimposed lifeless figures on the arch of Septimius. The monotony of the motives is reflected in the particulars; for instance, in the parallelism of the folds. Only in portraits was the characteristic style kept alive.

And when Constantine, improving on the various elements of the better times, of Domitian and Trajan, gave orders to compose a monument of this order, the few reliefs that were added were, like the ivories of the *Diptycha*, like the Christian sarcophagi, the Omega of classic art and the Alpha of mediæval art in Italy.

There is little to say about the minor arts in Italy in the centuries of decadence. Decorative painting was to a great extent supplanted by mosaic, the *opus sectile*, by tapestry and textiles. Gold work began to take on barbaric forms which came from the peoples of the North; the fibulas with rays are an instance. Glass work, the flourishing art which also came from the barbarians, continued to produce many tinted and artistic vessels, and glassware encrusted with gold in engraved designs, and the enamel in colors which was introduced into mosaics, became the fashion.

In Roman art during the decadence there were in embryo all the forms of mediæval art, and in treating of this, we must consider the Roman monuments of the 4th century. Whoever, therefore, studies classic art may be said to have exhausted his list in the artistic examples of the 3d century.

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24. HISTORICAL SYNOPSIS OF ITALIAN ART. From the time of Constantine to that of Justinian the Latin nations have garnered the inheritance of former ages and transmitted it to the modern world. Beneath many a layer of Hellenic art in Imperial Rome may be found meagre, crude and simple efforts which, on the decline of Roman splendor, fairly represented the artistic potentiality of the Latin race. By constant remolding these became the consecrated forms of Pisano and Giotto, just as on the decadence of Roman culture the noble and dignified language of Cicero and Tacitus was forgotten in the vulgar expressions of a common speech which by slow transformation became the language of Dante. So this art of rustics and peasants, obeying no classical rules, was nevertheless influenced and enriched by all the prevailing Græco-Roman forms whose types were in evidence everywhere; in the workshops of stone-cutters in Rome and in the provinces, even as far as the southern boundaries of the Roman and Phœnician colonies in northern Africa. The conservative spirit of the people of the Middle Ages clung to this nucleus of art; for it was a precious legacy from Rome to the young and almost savage West. Simple and modest productions of Christian art also contributed to this legacy. In the Catacombs were depicted humble memories of splendid secular life as well as tender renditions of Bible stories or of scenes suggested by the imagination of the early Christians.

Both Eastern and Western Christians had, in common, artistic traditions when representing Biblical themes. Some of these symbolical types, and the very lines of their composition, were used to and through the Middle Ages. Many artistic types of this period are lacking in imagination, borrowing nothing from the antique; yet despite time's additions and modifications, despite the restraints imposed on them, they are clearly early Christian types.

Again, there are Etruscan elements that enter into the arts, just as the Romance languages possess groups of words derived from old Italian dialects. These indigenous artistic elements can be traced through centuries; for they were not annihilated by meeting even a triumphant rival nor by any Occidental immigrant. A study of the relations of Etruscan to Roman art reveals a series of important facts as we trace in them the vestiges of Etruscan civilization, reminding us of the detritus of mountains which goes to form the fertile soil of the valleys.

From Byzantium — which was in close contact with the immortal art of ancient Greece — and from Syria, Asia Minor and Egypt there came westward, but chiefly into Italy, many new, rich and splendidly vital forms that were handed down from generation to generation, like songs and legends.

German elements produced no important deviations. The Roman tongues became richer in warlike words; but barbarians, like the Lombards, who had no individual architecture, could not make any contributions to art. When Roman art lost its majestic dignity, barbarians came to dress it with many-colored vestments resplendent with rubies and other precious stones, brilliant clasps and necklaces of glass and amber set in gold. The arrival of the Lombards in Italy marked the period of extreme decadence; now began the use of animal forms in decoration, hitherto peculiar to Germany, distinctly mediæval in character with processions of gryphons, dolphins, serpents, lions, leopards and centaurs. The pictorial treatment of everything was rigid and formal; human beings, wild beasts and plants were equally unrecognizable.

From the 7th to the 11th century Italian art slowly elaborated the traditions of decadent times, repeating uncertainly and often childishly hereditary forms. There was no revival during the Lombard rule. Before the revolt of the Iconoclasts, Italian art had reached the extreme limits of decay; and at this period Byzantine art could not have found a refuge in Italy. Feeble, persecuted and condemned by those who should have supported it, the art of Byzantium lacked energy to impress itself anywhere. The zeal of the Iconoclasts helped, nevertheless, to advance art; for some ancient types became steadily more and more obscure, mysterious and detached from everyday life. Naturalistic decorations supplanted sacred representations; and multitudinous animal forms, even pictures of hunting and fishing, were retained by mediæval artists.

Coincident with the political re-establishment of the Western Empire, Carlovingian art endeavored to reconstitute fragments of classic days. Through Cassiodorus' influence ancient manuscripts were transcribed in the monasteries. There was, also, a revival of architecture; and the Italian, Teodulfo, built the basilica of Germigny-des-Près. Lombardy, being influenced greatly by the Carlovingians, built churches and illuminated manuscripts. The golden altar of Saint Ambrosius, in Milan, the gift of Archbishop Angilberto II, was the work of Vuolvinio. Completed in 835 A.D., — in the Carlovingian era, — it is the *chef-d'œuvre* of Italian gold-work.

In various parts of Italy there were, at this time, artistic revivals; but before Italian art assumed its own peculiar form it was to be influenced by the art of Byzantium that flourished during the 11th century, whose beauty was similar to that of ancient Greece. After the 11th century art sought to adapt itself to out-of-doors, air and light. New expressions appeared and in the 12th century romantic art was flourishing. Towers now rose like lances from plains teeming with life; castles were built and cities were encompassed by walls and fortifications. And amidst all these rose the cathedral. Rude at first were these expressions of life's activities; but work refined them, and for their erection stones were chiseled and caverns cleft in the mountains of Luni, Verona, Lombardy and Istria. Few were the productions that exemplified the value of ancient art, except in Etruria, where various Artinians seemed to have descended from above at Ristoro d'Arezzo:— Wiligelmo and Nicola decorated the cathedrals of Emilia, borrowing ideas and methods from sarcophagi and classic marbles. Nicola established a lasting style upon

the Italo-Greek vases of Apulia, and Syracuse took the columns of the Athenian temples as models for her Christian edifices.

In the soul of Romanesque art ancient art survives; there remain in it traces of triumphal arches, thermae, theatres, forums, reflections of provincial rustic Roman forms, the legionaries, the sarcophagi of the Roman decadence (*Bassi tempi*) and primitive Christians; but the aspect of the fine arts changes and varies, owing to the tendency of the indigenous Latin elements to resolve themselves into national forms, just as the *langue d'oc* and *langue d'oïl* are different from the language *del bel paese dove il si suona*. From the ancient stem of Roman art new sprouts appeared wherever the standards of the Roman legions had once passed. Of the edifices erected in the Romanesque period few remnants exist. The houses were usually of wood, thatched with matting and straw. Not until the 12th century were laws enacted for roof-construction, in order to prevent fires. In the 13th century palaces were built in the shadow of the towers:—palaces of Reason, palaces of the Podestà and of the Capitano. We still find in Mantua, Cremona, Piacenza, Milan, Como, Bergamo, Brescia, Padua, Vicenza and Monza some of these so-called Palaces-of-the-People, or of the Commune, of the Public, of Reason, of the Consuls, of the Prætorium or of the Broletto. The timidity and the ferocity of mediæval man are shown in the juxtaposition of humble homes nestling under the grim towers of these palaces, as if for protection and preparedness against attack. In the 12th century when civil discords were raging, the cities of Lombardy so bristled with these towers that "Pavia, the towered" became especially famous. The very high tower erected at Bologna in the beginning of the 12th century by Gherardo Asinelli and that erected about the same time in the vicinity, near the house of Garizendi, are both famous. Meanwhile, upon the summits of the Apennine hills many castles arose; and chronicles tell of continual incendiary fires and destructive assaults thereupon. The towers of the gates and fortifications were crowned with battlements in which were loopholes, the gates themselves being fortified barbicans. The 13th century added drawbridges. From tower to tower men fought as from grappling warships; the vanquished one was razed to the ground. There was a marked advance in the development of Romanesque architecture in Piedmont and Montferrato during the 11th and 12th centuries. Here, as in Liguria, French forms were introduced. The oldest example of the new style in Lombardy is the church of Saint Ambrosius, dating from the beginning of the 12th century. Then in Pavia arose San Michele, a stimulus for the revival of architecture; and in Modena the cathedral, whose architect was Lanfranco. Subsequently arose the cathedrals of Cremona, Piacenza, Ferrara and Verona; the abbeys of Nonantola, San Benedetto di Polirone and San Zeno di Verona. Several of these structures ultimately lost their primitive form; but traces of their ancient common origin were not lacking.

Venetian architecture of the 11th century was the full and vivid flower of the powerful republic which, in close contact with the art of the Byzantine Empire, fashioned itself on the Oriental without, however, rejecting many forms of the Roman decadence existing in Ravenna and Istria. It also embraced the new arrivals from Lombardy by way of Verona. The basilica of San Marco, rebuilt in the second half of the 11th century, demonstrates in the highest degree the importance of Byzantine art to Venice. Romanesque architecture developed early in Tuscany. Pisa, a flourishing republic in 1063, constructed her own cathedral as Venice had done and about the same time that San Marco was built. In 1013 Lorenzo began the noble basilica on the hill of San Miniato and also his baptistry: "*il bel San Giovanni*," he reconstructed the ancient cathedral, or church, of the abbey of Fiesole and erected the ancient parish church of Saint Andrew in Empoli. There were not many examples of Romanesque architecture in Latium. In Umbrian architecture Romanesque characteristics predominate, as they did in and about Rome. The most complete 11th century Romanesque structure in the Marches is S. Maria de Portonovo; but the most splendid is the cathedral of S. Ciriaco at Ancona, restored in the 13th century. In Apulia the earliest architectural efforts were made by the Benedictines. In Campania, and notably in Caserba Ventria, we find Arabic and Norman forms united as in Sicilian churches and parts of Apulian cathedrals. The crown of Norman-Sicilian art is the cathedral of Monreale.

Romanesque sculpture developed in northern Italy in the cathedrals of Emilia under Wiligelmo and Nicolao; and Benedetto Antelami attained considerable eminence as did also the sculptors of Verona and Venice, who restored the early Christian types. In Tuscany its development was retarded and in Latium (Lazio) it became decorative under the guidance of its sculptors and of the Cosmati, who supplied ecclesiastical embellishments. In the time of Frederic II it flourished in Campania, Apulia and Sicily. During this monarch's reign the Gothic style prevailed in Apulia, the Basilicata and Abruzzi; and in the 12th century it became incorporated into the life, traditions and landscape of all Italy. The influence of the Gothic style was disseminated in Italy and Sicily through the instrumentality of the Cistercians. Its starting points were S. Maria d'Arbona and Fossanova. From out the *Studium Artium* of monasteries came artificers, who everywhere introduced the Gothic. Cistercian enthusiasm spread to other orders; and their themes and elements endured until schools and masters of a new art blended them, whereupon they became extinct. The Gothic was thus expanded and consolidated until square and plummet passed from the monks' hands into the laymen's.

In the 13th century (*Dugento*) pictorial art was still in its infancy. Human sentiments could scarcely be recognized as overcoming the rigidity of the material used to depict them; yet common objects became motives, supplanting church symbols: the sweet, everyday events of life instead of formal representations of abstractions; and the flower of youth was substituted for Romanesque asceticism. Love of nature was manifest from the beginning of the 13th century in Saint Francis of Assisi's "Can-

ticle of the Sun" and this love became more and more potent. But in the new art one looked in vain for the cell of reeds of Saint Francis, the poverty that was his bride and the corner-stone, reality. The monk of Assisi talked of love, and art responded in her own fashion by erecting over the remains of the saint the most beautiful house of prayer in the world. Il Beato (Fra Angelico), Margaritone and Ginuta attempted to portray it; but art was not yet competent to describe its proportions; it had no words or phrases to express them. From Bertinghieri to Orlandi, from Ginuta to Rainerio d'Ugolino, from Margaritone to Guido da Siena there is a slow progression of low forms. In vain does modern criticism seek to exalt Guido da Siena and make him the representative of the Renaissance by boasting of his pictorial palimpsest in the public palace of Siena. In the 13th century *Roma docet!* Torriti created more splendid mosaics; Pietro Cavallini created with his mosaics and frescoes a new art with an old Roman soul; Filippo Rusuti introduced contemporary costumes into the mosaics of Santa Maria Maggiore; Giovanni di Cosma, in his sculptures and enamels, makes the latter brilliant with cosmatic forms and uses roped or twisted columns in the façade of an edifice. The Cosmati in the 13th century in Rome was a family of workers in mosaic and tempera. Among these masters we find Cimabue, whose name was Giovanni di Pepe, who is usually regarded as the founder, the father, of Italian painting. In Assisi, in the calvary of the greater basilica he created the "Drama of Golgotha." At the close of the heroic period, wherein Cimabue, Pietro Cavallini and Toriti were the great trio, modern art began with Giotto, pupil of Cimabue, and influenced by N. Pisano the sculptor whose style was, later, frequently imitated. Giotto is the first free painter of truth, of life. In the basilica of Assisi he rejuvenated everything, giving free play to his emotional nature, taking advantage of fleeting impulses of sentiment, determining the characters of men and of things. He continued his work of restoration at Rome, Florence and Padua; again at Assisi; at Naples and again at Florence and at Milan, crowning the efforts of the past and becoming the forerunner of those of the future. His genius dominated the 14th century (*Trecento*). A whole constellation of artists revolved in his luminous orbit. Giottism is the name of the Florentine style pervading the works of Giotto, Gaddi, Orcagna, Fra Angelico and Gozzoli. It was killed by Masaccio. Throwing aside the royal mantles — Byzantine accoutrements — Giotto draped his figures in the humble garb of the people. He hearkened to the voices of souls, to the whisper of sentiment, to the cry of human passions. Giotto, like Dante, portrayed with rapid strokes living emotions; now representing Magdalen regenerated by grace, now the blessed Francis who loved the sun, the plants, all his fellow-creatures,— painting the rock on which he rested, the dawn which chased away the darkness and the birds who flew about him who would not injure them. In the church of Arena at Padua, Giotto depicted the Life of Mary ("umile e pia più che creatura": "more pious and humble than any creature") from the joys of maternity to the sorrows of exile; from her atrocious sufferings to her everlasting joys. In Santa Croce at Florence he depicted John the Baptist, who trembled not before the tyrant and died praying. Saint John the Evangelist, who rose to a contemplation of the mysteries of the hereafter, was another inspiration to his brush, and in the palace of the Capitano at Florence, Giotto painted God sitting in judgment on the Florentines, both lowly and great, surrounded by a chorus of citizens, among whom is Dante the painter-poet, who gave form to human knowledge.

Venetian and Florentine art met in Florence, penetrated into Umbria, Assisi and at last into the Marches. At Siena, the city of the Virgin, painting flourished without the dramatic impulse of Giotto, without his human simplicity. Duccio di Boninsegna, who borrowed forms from the Florentine Cimabue, adapted them to the elegance of the Byzantine School, made them splendid with imperial richness and molded them in rigid ecclesiasticism. Simone Martini, generally called Memmi, a follower of Duccio, a friend of Petrarch and painter of Laura, supplemented what was lacking in Venetian art. Gradually his coloring became warmer and his gold changed to crimson. At Assisi, he worked with his brother Donato; at Avignon he appropriated the colors of the most beautiful gems and founded a school which hastened the advance of painting in France. At Siena, Lippo Memmi, his cousin, produced beautiful works and also at San Gimignano, Orvieto and Pisa. Venetian miniature painters reproduced them in hymnals (books of chorals) and liturgical books; and at Avignon another imitated him in illustrating the parchments of San Giorgio, founded by Cardinal Jacopo Stefaneschi.

While Siena practised the artistocratic forms of Duccio and Simone Martini in contrast with the popular style of Giotto, the brothers Lorenzetti of Venice modified art at their expense. In the courthouse of Siena, a monument of civil wisdom, decorated in conformity with the doctrines of Aristotle, and at Arezzo, Assisi, Florence and Massa Marittima, the Lorenzetti displayed their art: Ambrosio Lorenzetti, in Tuscan garb, painting the beautiful; and impetuous Pietro, sometimes called Pietro Laurati the rough, savage and dramatic. This blending of the style of Duccio and of Simone Martini with others foreign to Siena, appropriated and assimilated by the Lorenzetti, continues until the beginning of the 15th century in innumerable pictures by the constellation of Venetian artists. The diffusion of the Venetian style was in all directions: it conquered Pisa; Barnabo da Modena accepted it; Allegretto Ruzi and Francescuccio Ghissi retain traces of it; Andrea of Florence was influenced by it; and Lorenzo Monaco learned much from it.

Giottism held its ground in Florence during the 14th century; but the traditions of Giotto perished with Agnolo Gaddi, whose work was rigid and expressionless. Spinello Arentino awoke from the somnolent Florentine art of the second half of the 14th century and was the forerunner of a style seeking new ideals, and freshened by study of the antique combined with that of nature. In this same period Giovanni di Milano was painting for the city on the Arno's banks. Avanso and Altichiero were

accurate and excellent historical painters; in some of their pictures, nobles and their families are portrayed being led to the throne of God by their patron saints. With these two men and Antonio Veneziano, or Antonio da Venezia, whose genius is revealed in the Pisan Campo Santo, and Tommaso da Modena, who painted the story of Saint Ursula at Treviso, came the bright springtide of art in northern Italy at the close of the 14th century. Cennino Cennini, author of the oldest Italian treatise on painting, painted about the time of Aretino.

The popular *motif* impressed on pictorial art by Giotto was similar to that impressed on sculpture by Niccolò d'Apulia (called Nicola Pisano). This style appeared first in Tuscany, at Lucca, in the carving of one of the side doors of S. Martino. Here Niccolò showed that he had seized with great ingenuity the power which is inherent in antique art as well as the fullness and robustness of sincere naturalism. In Pisa he decorated the exterior of the Baptistry. He placed at the junction of the first row of arches and at their crowns (keystones) heads and busts, a restoration of the human *motif* that comes from genius and forces one to say that modern art spoke, at its very inception, the last word. When, with the aid of his followers, he had completed his great task and was prepared to carve the pulpit of the Baptistry at Pisa, he was accorded the citizenship of Pisa, and was nominated a citizen in its Hall of Fame. From the pulpit of Pisa (1260) to that of Siena (1266–68) Niccolò's style spread rapidly. That displayed at Pisa is grander, more monumental; at Siena, more Christian, more dramatic. Under the impulse of his genius the monument grew with great unity, though the individuality of the workers was evident, especially of Giovanni Pisano and of Arnolfo. From Siena, Niccolo d'Apulia went to Pisa, thence in 1273 to Pistoia, and in 1274 to Perugia to work on the fountain of the Piazza Maggiore, brought to completion by Giovanno Pisano, his son. In 1278 died this great sculptor, whose genius was the link between ancient and modern art. He educated Pisa, and Pisa taught Italy. Italy was conquered by the chisel-strokes of the school of Niccolò d'Apulia. Giovanni Pisano, who made his statues eloquent of passion, spread his paternal art throughout Tuscany, Umbria and Ventia; Arnolfo, his comrade, invested his marbles with ancient beauty, and at Rome triumphantly transformed the art of the Cosmati; Andrea Pisano cast in bronze the door of the Baptistry at Florence through which modern art passes victorious; in Naples, Tino da Camaino founded a school which, until the *Quattrocento,* repeated the artistic dictum of the Pisan school; Giovanni di Baldunio da Pisa brought models to the masters of Campione and Como in his arch of Sant' Eustorzio at Milan. Toward the close of the 14th century the Venetians elaborated new forms in sculpture, as they had already done in the realm of painting. Farobello and Pier Paolo dalli Mesegne are, among others, specially noteworthy. Mesegne worked with his brother Jacobello. And thus Venetian sculpture found a place in all Italy, from Bologna, where it held the field, to Milan, where the florid Gothic dominated the last of its great structures, the basilica of Saint Petronio and the Milan Cathedral.

The *Quattrocento* gave utterance to national ideals, without losing fidelity to nature, intensity, passion or soul. It did not sacrifice itself for the sake of effect; it spoke without rhetorical declamation. From forms still crude, from realistic harshness, sprang the most beautiful flowers of sentiment. The True was worshipped with childlike admiration and tenderness. Romanesque art was trampled upon by the Gothic, but not destroyed. Amplified, it came back midst the Gothic resplendently:— it insinuated itself among spires and pinnacles, paused in its experiments, expanded the proportions of structures, rounded off the sharp corners, squared contours and flattened summits. Thus it regained its position and prominence. The antique forms were recast and blossomed again among the Christian. Not forgetful of the glories and motives of its ancient life, Italian art recalled classic statues; again the nude saw the light of day, even at church portals; for the beauty of the nude figure no longer seemed demoniac, but a gift of God. Art, in its new youthfulness was the forerunner of humanism, of a restored civilization.

Architecture in the *Quattrocento* received its first impulses from Filippi Brunelleschi, a friend of Toscanelli and Donatello, whose chief creation is the cupola of Santa Maria del Fiore. Among his followers, Michelozzo and Giuliano de Mariano are the most distinguished. Leon Battista Alberti, more Roman in his architecture, designed the temple dedicated to the goddess Isotta by Sigismondo Pandolfo Malatesta at Rimini. Bernardo Rosellius built for Pius II at Piacenza, the Piccolomini Palace, the Commune Palace, the cathedral, the campanile — a whole city, in fact, of rare elegance.

With Florentine grace and witching delicacy Luciano di Lamana designed the Palace of Pesaro, the newer portion of the Palace of Urbino, and that of Gubbio for the lords of Montefeltro. Benedetto of Milan built the model of the Florentine city palaces, and that of Strozzi in Florence. Bramante d'Urbino, first in Milan and then in Rome, put the crown of glory on the architecture of the 15th century. Bramante was also a fine painter.

Painting in the 15th century appeared in as many guises in Italian cities as the colors of their flags. The walls of noblemen's palaces were adorned with frescoes and the churches were splendidly decorated. Every public festival was a festival of art. If the mysteries, if the comedies of Plautus and Terence were presented; if the crowd proffered homage to their lords, if the princesses were going to church in their bridal carriages, art improvised scenery, arches and triumphal cars. These carried the maidens to their wedding; and art decorated the nuptial chests (*cassoni*), painted in those days with pictures from the Boccaccian fable of Griselda, or the triumphs of Petrarch. The anchor, with the Madonna seated holding the Holy Child in Her arms, the illuminated Book of Prayers and the Gentilezze of goldsmiths, were other favorite subjects for *cassoni* decoration. Art in the beautiful *Quattrocento* breathed in all things; in the Majolica vases, in the embroidered robes, whether velvet or

brocade, on the leather cover of the merchant's ledger, quite as much as on the binding of devotional books. From his beautifully ornamented cradle until he slept under the arches between the chapels, escorted by virtues and liberal arts, man was guided by art. She was in the very air, in the *Quattrocento*, and permeated social life. It seemed as if on old Olympus the gods must needs clothe themselves in the dress of the *Quattrocento* and that heroes of antiquity came to life to enlist as soldiers of the republics and the Italian Signoria.

It seemed as if the biblical characters revived to take their place among the officials and mayors of the corporations; it seemed as though God and the Saints descended from the clouds to take human form. Every figure, sacred or profane, allegorical or historical, found, in the society of the artist, his garment, his background. They were no longer conventional forms; but imaginary or historical scenes were represented with such simplicity as to make it appear that one had seen them with one's own eyes in the public square, or along the streets of one's city, on the verandas or under the wooden roofs of one's own house. To Masolino da Panicale and to Masaccio belong the honor of bringing new ideals to *Quattrocento* art; of starting the school that culminated in Raphael and the founding of Modern Art. They determined how to place their figures in the landscape; in what planes to put them; and knew and applied the laws of perspective. The human form has its bones covered with muscles and skin and it can live and move in a real world;—it has an individuality. The work of Gentile da Fabriano looked backward; it was still Gothic. Michelangelo said he had a hand as *gentile* (delicate) as his name. Pisanello painted birds and animals and studied their habits, movements and instincts. The influence of these two last-named masters extended to Venice, Lombardy, Emilia, Tuscany, Umbria, the Marches, Rome and Naples. Meanwhile Piero della Francesca was exerting a great influence on art. He taught perspective at Urbino, Senigallia, Rimini, Bologna, Ferrara and Padua and like a comet left behind him a trail of light. Pacioli said of this stern painter that he was "monarca a suoi di" (monarch of his day). He brought the art of perspective to the same height it reached with da Vinci; his figures stand clearly and luminously in the atmosphere; his shadows are delicate and transparent and the flesh tints are like faint roses or the tender coloration of spring flowers. He used landscape backgrounds, experimented in painting in oils and knew aerial perspective.

While this Tuscan grace was permeating Italy, Fra Giovanni da Fiesole, better known as Fra Angelico, or *il Beato*, the blessed, was painting diaphanous saints and angels: *veramente di Paradiso*. His art was a sweet psalmody. The ladder seen by Jacob in his dream, upon which fair angels ascended to Heaven, was seen anew by Giovanni, whom posterity calls the Blessed. He composed sacred scenes with great ingenuity and with a childlike simplicity. His Madonnas are clothed in Gothic tunics; their eyes look out beneath faintly penciled brows; their form is the lithe, slender body of immaturity. Fra Angelico prayed before beginning a picture and wept when he painted the Crucifixion. His devils are mild, — never devilish.

Benozzo Gozzoli and Fra Lippo Lippi painted more substantially and developed further the forms of *il Beato*; but they lacked his ingenuousness. The former was the naïf and smiling story-telling artist of the Renaissance; the latter a vigorous, rugged painter, not wholly of the cloister.

Andrea del Castagno and Paolo Uccello, stronger than Gozzoli and Lippi, were not so mystic or contemplative. Andrea had brutal vigor and Uccello tried the nude and was the first to paint battle scenes and to study perspective. Persellino, the youthful and gentle, sought for corporeal beauty, and his pictures are full of lively grace. Castagna, Uccello and the perspective laws of della Francesca inspired Baldovinetti, the two Pollajuoli and Andrea del Verrocchio, whose delineations of the human form were robust, correct and of almost a plastic quality. Baldovinetti gained fame from his mastery of minute details. Pietro and Antonio Pollajuolo were the first to reject tempera in favor of oils; they were goldsmiths, niello workers, engravers, perhaps etchers; and they were the first to dissect the human body for art's sake. Verrocchio, a great sculptor, was the first Florentine to understand landscape. His Colleone statue in Venice "stands for the most magnificent equestrian statue of all times."

Sandro Botticelli painted for the secular world; he was original, nervous and vehement. Myths and fables were his themes oftener than Bible stories. A face long, narrow and with full, steadily gazing eyes, has become the "Botticelli face"; and with the Pre-Raphaelites of England it was revived, especially by the brush of Dante Gabriel Rossetti. In Botticelli the art of Florence became a canticle of spring, redolent of jessamine and roses. Two of his followers, Filippino Lippi and Ghirlandajo, closed the era of "*Quattrocento* Florentine painting." The former had amazing facility, invention, grace and clarity; the latter loved to paint musical instruments as accessories in many of his pictures, and was a great master in mosaic.

Lucca Signorelli, the Cortonese, was strong, quick and resolute; his pictures are warm, ruddy, sunburnt. He was always a mountaineer, but beneath his rough exterior was a glowing soul. His nudes seem to be hewn with an axe; but the results are robust, healthy bodies. He has been called the "Dante of painting"; but he is par excellence the painter of the nude.

The Tuscan school of the *Quattrocento* had as the crowning glory of its sincere efforts, of its indefatigable research, the work of the giant Michelangelo, and of Leonardo the prophet of modern times. Michelangelo remained a sculptor in his painting; his prophets, his sibyls, have the imperial cast of the Moses who is about to arise and terrify with his thundrous tones. He disdained the grace which other painters of the *Quattrocento* cherished; the latter had been prodigal of flowers and smiles when portraying sacred figures; he infused a sculptural, monumental grandeur into them. They had refined and prettified everything, whilst he enlarged everything and raised it to sublime proportions. His athletes

wrestled under the vigor of his gaze, or reposed solemnly in their corners. The physiognomical traits of his figures disappear, to give place to the lineaments of the imagination; we cannot see into the foundation of the works of Michelangelo, for the man himself, alone, fills the entire space and breaks down the obstacles and the limitations from within; life dwells in him and bursts forth from him.

Leonardo da Vinci, inspired by his vision of things, impelled always by an irresistible desire to do something new, restless because of the sense of perfection, which ever wider horizons had hitherto denied to his attainment, left uncompleted the greater part of his work because he found matter inadequate to depict the soul of things. Sublime in every stroke and in every word, Leonardo, even in his own day, appeared a prodigy. He held the eye of the painters of Lombardy, who revolved about him as satellites about a central sun. The pure ideals and idealism that came from past ages and the accumulated energy of generations, all found expression in this marvelous man, who defies study and analysis. He painted two of the world's masterpieces, 'Mona Lisa' and 'The Last Supper'; and was sculptor, engineer, architect, scientist, scholar, musician and poet. He invented the wheelbarrow and a machine that almost flew, and was the most versatile and fastidious man of the Renaissance. Elsewhere in Italy were men of genius who had new ideals and loved nature. The day came when iconographic progress was rapid and when idealism was elevated and purified by time.

In the Marches and Umbria, painting in the *Quattrocento* chose sacred and allegorical subjects and treated them as though invaded by the spirit of the people who went through life with a scourge. This degenerated into a forced naturalism and a vulgar conventionalism. Niccolo Alunno, often known as N. da Foligno, appeared sometimes to be a shouting savage, who depicted sorrowful, wrathful, disconsolate figures. Carlo Crivelli, a Venetian, came also to the Marches and gained force in expression, along with exaggeration and grotesqueness. Crivelli looked at the world with the eyes of a magpie, for he liked dazzling colors, gorgeousness and splendor. He embossed gold ornaments on his pictures and precious stones were sometimes embedded in the crowns. Suave Tuscan art, fragrant with spring flowers, breathed upon this region; and the influence of P. della Francesca, Fra Angelico, Gozzoli and Verrocchio was made manifest, and to a lesser degree that of Perugino, Pinturicchio and F. di Lorenzo.

Perugino invests his figures with a rare grace, although they all bear the imprint of the same model, the same sentiment of devotion, humility and abstraction; his saints gradually became rosy and ethereal while his other personages are transformed into a monotonous, melancholy and mellifluous type. From the works of Perugino in particular was molded the crowning genius of the ideals of the art of Umbria and the Marches: Raffaello d'Urbino — Raphael. Pinturicchio, frequently the companion of Perugino, was intoxicated with color. Fiorenzo di Lorenzo is vivacious, imaginative and a sure draughtsman. His landscape backgrounds are exquisite. Raphael exhibited his tendencies in his earliest productions. His Florentine figures were incomparably sweet and delicately reposeful. In later work in Florence he drew inspiration from that ancient art which had dominated the banks of the Arno, as well as from modern sources. When he painted in Rome, this great assimilator and eclectic gave us models of consummate art. Raphael, who at first, like Perugino, delighted to depict the sweetness of the devout Umbrian maidens, passed to the noble elegance of the Florentines. In Rome he became a child of the South and idealized the vigor of the peasant women of the Roman Campagna, their figures of ample proportions, their skin bronzed by the sun; and of children with large eager eyes and black hair. The last of his pictures was the Transfiguration; his pupils placed the picture at the foot of his bed when he closed his eyes forever, the *gentilissimo Raffaello d'Urbino*.

The Emilian region gave tardy signs of a revival in painting. From the school of Squarcione in Padua, seeds were sown in Emilia. Cosmé Tura of Ferrara appeared in the second half of the *Quattrocento* and became the head of a school. He was like a goldsmith, who with hammer-blows wrought figures in sheets of metal and illumined them as from an inner flame. At this time flourished Francesco del Cossa, painting rugged saints, with enamel-like coloring. Ercole de Roberto, Lorenzo Costa and Ercole Grandi were disciples of these two masters. Returning from Ferrara to Bologna, several of the Ferrarese masters,— Galasso, Francesco del Cossa, Ercole de Roberto, Lorenzo Costa,— held the field in painting. A comrade of Costa was Francesco Raibolini, called Il Francia, a painter whose well ordered intelligence and simple and pious mind, imparted to his pictures a sense of scrupulous conscientiousness. One of his contemporaries was Francesco Bianchi Ferrari, of Modena, who made accuracy of execution well-nigh a religion. He was Correggio's master and was known as Frare, or "the Frarre."

Correggio was the acme of Emilian art. Except for his first figures, which partook of Bianchi's spirituality and solidity, Correggio held his own as a colorist and appeared to derive his tints from rubies, sapphires, topazes and amethysts, from the pigment of roses, the brightest colors of the rainbow, and was the first to paint diaphanous shadows. Correggio was the painter of light. With his colors harmonized like the tones of the lyre, he diffused happiness and joy in the hearts of those about him. In a blending of lights and shadows appeared his 'Danaë'; in an autumnal landscape distilling gold from its verdure, his 'Leda'; in an aureole of golden hair, his 'Antiope Asleep'; enfolded in a downy cloud of love, the nymph 'Io'; poised in space, 'Ganymede,' zephyrs toying with his blond locks. His angels in the 'Madonna di San Francesco' vanish in the morning light, rosy with dawn; those of the 'Madonna di San Sebastiano' are illumined by the light from the top of the cupola and the robes of the saints gleam in rose and gold; the other angles in the 'Night' ('La Notte') are enveloped as in an aura which emanates from the Holy Child and permeates the darkness. While Dosso Dossi, the Ariostesque painter,

put strong enthusiasm and phosphorescent brilliancy into his fantastic forms, Correggio enveloped his in the most voluptuous twilight. He cast treasures on the earth, this *pittor delle grasie!* He was a master of foreshortening and of chiaro'scuro, and with da Vinci the first to paint the smile of woman. His name was Antonio Allegri.

In Venice, painting, which in the 14th century had not developed as much as in other Italian cities, was given a living impulse in the 15th century by Gentile da Fabriano, Pisanello and still more by that master Squarcione, who was the founder of the greatest school of Lombardy. As on the head of Brunetto Latini there fell some leaves from the laurels of Dante, thus glory came from Squarcione on the head of his adopted son, Andrea Mantegna. The school of Squarcione became widely known. From Negraponte, an island in the Ægean, from Dalmatia, Parenzo in Istria, from the Venetian Lake, from the capital of the Estensi and from learned Bologna artists flocked to this school. Above all others, like a giant, rose Mantegna. Mantua was the principal scene of his fame. He had in his soul and in his art the sentiment of Roman grandeur, expressed in its highest form in the 'Triumph of Cæsar,' now at Hampton Court. The classic was his master; and triumphal arches, ancient ruins formed the scenes in which were displayed Christian ceremonies. The sculpturesque figures of Mantegna lacked the atmosphere with which they were surrounded by Giovanni, son of Jacopo Bellini, who with his brother, called Gentile, headed the Venetian school. Giambellino Giovanni, or John Bellini, departed but slightly in his early work from Paduan or Mantegnesque forms. But, little by little, all that he touched took the color of gems; his shadows became transparent; his clouds floated luminously through the air and visible harmony permeated all his idyllic compositions. The knowledge and science of Mantegna became poetry in John Bellini. His sublime Madonnas rose to reign over the earth, with beautiful silver-white drapery about their heads, with opalescent flesh tints, with the sweetest expression, seated on thrones of marble beneath canopies made of golden mosaic. When Antonello da Messina came to Venice with the "secret" of the Flemish painters, the van Eycks, —the new oil medium,— Bellini ceased to paint in tempera and became a pioneer in the new method. "He was not an artist, but a veritable school of art" has been said of him. A host of artists around John Bellini became intoxicated with color: Antonello da Messina and Carpaccio, Cima da Conegliano and Boccacciero, Bartolomeo Montagna and Morescalco, Lorenzo Lotto and Giorgione. Antonello da Messina probably went to Ghent and brought to Venice the new oil, or perfected drying medium. Carpaccio is a profound, yet amusing teller of stories in color. Cima's landscape and architectural backgrounds are better than his figures. Montagna painted in a low key; his figures are very dignified and his landscape backgrounds are poetical. Morescalco resembled Montagna. Lotto often imitated Giorgione and Titian and his compositions are at times affected and exaggerated. At the period of the Bellini colors in painting rivaled those of stained glass windows from Murano, or rich fabrics from the Orient — color fairly sang! Giorgione placed the crown of the *Quattrocento* art on Venice, but, snatched from life when only 33 years old (he was born in 1477), his task was completed by Titian. Giorgione was like a splendid knight in shimmering armor, conquering the realm of beauty, only to die in the very flower of his life. The versatility of this artist's genius was manifested in the realm of color, in the sweet womanhood of the 'Virgin,' with long oval face and thoughtful eyes veiled in shadow; in 'Venus' of the ivory skin, who, in draperies of silvery white and red yields to slumber, while the light gleams on her beautiful limbs and the green earth smiles beneath a lightly clouded sky. In every picture he shows the same love of nature in her varied moods, a most delicate selection of all the minutiæ, the same noble style, the same luxuriant forms; a desire for light, air, nudity, beauty. The genius and knowledge of Giorgione resembled those of Titian, although very many modern authorities consider Titian never to have equaled Giorgione in any respect. When doubt exists concerning the attribution of a masterpiece ascribed to either, it is not accorded to Giorgione if it fall slightly below supreme excellence. The two were students together. Titian bathed his canvases in sunlight, made the blood seem to course through the veins of his figures and, with vivid colors, reproduced living flesh tints. The doges, the Emperor Charles V, Philip II, the Medici, the Gonzago, the Estensi, the Farnesi and Aretino sat to him for their portraits, in which they are immortalized. Titian's daughter, Lavinia, superlatively beautiful, still bears witness to the love and pride of her father. When he died, the voice of joy was silenced, the splendor of the Venetian Republic was dimmed. With this cessation of the festal chorus of the last representative of the art of painting transmitted by Giorgione to Titian, Tintoretto appeared, heavy in coloring and in thought. He seems to have painted at fever heat, and done in a single day, his *chef d'œuvre*, the 'Miracle of San Marco,' so strong, full and resolute is his brush. It is as though a flame had darted from the sky and enveloped the earth; the flesh of his figures is golden, the very marble is gold-illumined; under his hand autumnal foliage takes on crimson tints; his colors are of flame and his painting is flamboyant as the setting summer sun.

Italian sculpture and painting advanced along similar lines. In the *Quattrocento* there were pioneers who rose spontaneously to the summit of the ideal and they attained the highest eminence. Sculpture did not progress, as some have affirmed, outside the sepulchre of classic antiquity, made up of patched counterfeit copies of the antique. New apostles of art, Tuscan sculptors, traversed Italy and conquered it with their chisels. Now splendid monuments and equestrian statues were erected on public squares. Now triumphal arches were built and the churches were transformed into temples of beauty. Florence, the new Athens, as with a winnowing-fan swept wealth and civilization toward her sister cities. The *trecento* had brought forth great periods of learning, of highest mechanical arts, the seven liberal arts, the seven planets, the seven sacraments, etc.; but the *Quattrocento* bore the palm in industrial progress. Zampo della Quercia even sculp-

tured the virtues around the Gaia Fountain at Siena as noble matrons, proud of their moral beauty. Learning left its traces on the *Quattrocento;* but the artists in representing this or that sky seemed to have lost their memory; they made and unmade freely, weaving on a warp that was no longer classic, consigning to oblivion Marciano Cappella and Pendenzio, Cicero and Boetius, Saint Augustine and Saint Thomas of Aquinas. The representations of Old Testament scenes, after Ghiberti had depicted them on the doors of the Baptistry at Florence and after Jacopo della Anuncia's work in the S. Petronio at Bologna, no longer bore the same relation to the antique. It was found in painting,—not so much in sculpture,—that in the desire for monuments much had to be omitted because of unsuitability. This tendency may also be noted in the themes taken from the New Testament, limited to the scenes from the Passion of our Lord. Donatello was the greatest among the masters who represented the tragedy of the God-Man. There never was a more violent outburst of passion in art, never a more forcibly shown distinction between the antique and the modern, and never the antithesis between classic serenity and Christian agitation. The concentration of the sculpture of the *Quattrocento,* shown in some of the most significant scenes in the life of Christ, demonstrates that sculpture lent itself to dramatic rather than to historic scenes and preferably to the culmination of the lore which had come down from classical days. Thus in motifs from the lives and legends of the saints, the sculptor synthesized and summed up the chief essentials; he suggested the scope of unexpressed actions, allowing one to guess at their fulfilment and to prefigure the original form. From the beginning, Donatello's chisel affirmed these artistic aims exemplified plastically in 'Saint John the Evangelist' and the 'Moses' of Michelangelo, and created the type of 'Saint John the Baptist,' who fed on honey and locusts. In order to make figures true to life, the Virgin, who previously was represented as a mother playing with her infant son, or as a good housewife, now becomes more mature; the infant Jesus becomes the little lord of the universe; angels lose their infantile ingenuousness and become graceful youths. All that with which *Quattrocento* had formerly clothed its art, kindly expression, natural vivacity, common simplicity, was now abandoned because the idea of strength, of size in Roman art, of sovereignty, was opposed to the pure, ingenuous representation of sacred forms. The contrast was established also between the pictorial elements that had come into modern painting and sculpture. But only a genius like Michelangelo could personify the national tendency to place art in unison with the great memorials of antiquity, to make it prominent, or to detach it, as in the foundations of the Thermæ, the forums and the Roman circuses.

It was natural that on Italian soil there should be a tendency toward a living type, and that art should obey certain laws which rule during certain periods, progressively advancing, augmenting, increasing in size and continually amplifying its chosen forms. But all through the 15th century sculpture was not permeated with classicism as literature was; it was animated thereby when in accord with its character, it sought the antique by degrees as it came from the purest sources and beheld a vision of ancient civilization that daily became clearer. Its acme of development was at the close of the *Cinquecento* when it acquired the grandeur of sculptured forms, the complex ingenuity of composition, the restless expression of emotion and began to look at examples of plastic art that had ripened elsewhere, inspired by another civilization. Before this, however, the assimilation of the antique was gradual and naturalistic art in the *Quattrocento* was the highway leading to the invasion of classicism.

Italian sculpture was inspired by the antique so that it possessed artistic liberty and a love for the nude. But modern art, ere it modeled the nude and gave free scope, perfected the head and gave the bust a place of honor. Not alone were the features represented, not alone the physiognomical traits, but the individual character, truth to life. Michelangelo omitted even the physiognomy in order to represent the thought. The bust was the portrait of a personality, but it did not fulfill the human desire to leave a remembrance or to have enduring fame. Monumental art in the *Quattrocento* found its loftiest expression in the equestrian statues of Ferrara, Padua and Venice; an art that made triumphal arches of the gateways of palaces and castles, that made holy places of mausoleums and mortuary chapels; an art that peopled altars with statues. Mistress of her tools, Italian sculpture of the *Quattrocento* answered to the multifarious needs of the people and diffused itself throughout all the courts, in castles of France, in Flemish guilds, in palace of the sultans and in the royal residence of the king of Hungary.

At the beginning of the *Quattrocento,* Niccolo Lamberti di Arezzo rivaled, with his metal mouldings on the door of the Mandorla of Santa Maria del Fiore, the ancient vases of Aretino; Lorenzo Ghiberti applied the laws of painting and perspective to the door of the Baptistry and transformed low reliefs into pictures full of life. Meanwhile Lucca della Robbia, who had not the high imagination of Ghiberti nor the epic grandeur of Donatello, nevertheless placed amid vases of lilies, Mary, the fairest lily of earth; and with this sweet image he brought joy into Tuscan life during the *Quattrocento.* Della Robbia worked in bronze and marble, but is best known as the founder of glazed terra cotta sculpture, made for, and chiefly found in, Florence. His son and grandsons continued his work; but before the close of the 16th century the art was in complete decay. But above all Tuscan masters of this century towers Donatello, who translated man, the whole of man into marble, bronze and plaster; whether he placed the valorous knight Saint George (patron of the Corporation of Cuirasses) in a niche of San Michele, or erected rugged and wrathful prophets in the cathedral; whether he sculptured a dissolute dance of youths or gave the (supposed) bust of Niccola da Uzzano the character of a tribune. For a brief time classicism conquered him after his second trip to Rome; but life once more broke in upon the sacred history of Padua, in the harrassing drama of the Crucifixion and in the parchments of San Lorenzo of Florence.

Verocchio ("the true eye") is the name by

which Donatello's follower Andrea di Cione is known. He gave an immortality to Bartolommeo Colleoni that this great captain's own exploits did not gain for him, even though he was without reproach and threw his gauntlet to the foe under fire and catapult.

Among the other pupils of Donatello is Agostino di Duccio, who, like a neo-Attic sculptor, draped his figures in clouds of tissue and cloth, with garlands, spirals and curves. At the same period lived Desiderio da Settignano, who gave his marble a soft vagueness, which seemed to be attained with a feather and not with a chisel. He had great dignity, refinement and elegance. Mino, his disciple, gave everything a facile, light character as though executed in wax or paste, and was, as Vasari said, more versed in the graces than in the fundamental canons of art. Very prolific and with a peculiar and interesting mannerism, Bernardo and Antonio Rosellino and Benedetto da Mariano (da Maiano or Majano), whose works exhibited the effect of study of perspective on sculptors and sculpture, were other pupils of the master. In marked contrast with these is Antonio Pollajuolo, who loved the strength shown in the muscles of the athlete. Their realism is seen in an unfeeling spirit of analysis, in the want of repose shown by the form of the larger extremities, in their knotty fingers and steely tendons. There was striving for effect, indicative of the beginning of a decline in art. When Florence was laying the foundation of modern sculpture, Jacopo della Quercia at Siena, following Donatello's style rather closely, represented the return of art to the forms of its Etruscan ancestors. His art was free from all grossness; he died expecting his soul to be transformed into that of Michelangelo by an artistic metempsychosis.

A Hercules was lurking in all the marbles Michelangelo chiseled. He slumbered in the white blocks from the quarries of Luni and, awaking, cast far from him like flakes of snow the chips that covered his powerful muscles. And behold! Moses arose with a look of sublime wrath and passion, on whose lips were forming words of malediction. Again behold! the slaves of the Museum of the Louvre, who shudder on awaking and who uphold this old world on their mighty arms. Lorenzo di Medici, the pensive, is another sombre creation of the master,— the Hercules, for once, omitted in favor of princely grace, beneath whose head pauses the shadow of death's wing; and the "Night" (*la Notte*) who sleeps on the sepulchre of the Middle Ages, shunning the light. Michelangelo is steeped in sadness; over his spirit are cast the shadows of human sorrow. In the midst of their glory his heroes hear the wailing of humanity. He is lifted, however, above the things of earth and touches the heavenly; he exalts his divine sentiment and meets the mysteries of existence; he builds his art on human tragedy and attains the sorrow of the universe. Michelangelo is the huge limit of modern art, as the marble mountain which he himself carved was transformed into a giant whose crest scales the clouds, shedding waves of light o'er the Tyrrhenian Sea. Michelangelo was this giant on the summit of Italian art! The other regions of Italy had not the sculptural genius which combines in itself the multiple forces of production. At Venice the Tuscan masters had given an impulse to the formation of the new school. Sculpture in Lombardy in the *Quattrocento* is typified in the statues that adorn the cathedral of Milan. It is recognized with less uncertainty in the second half of that century in the works left in the Carthusian Monastery of Pavia by the brothers Mantegazza and by Amadeo and his followers. The Mantegazzi were noted for their drapery resembling wet paper,— "the cartaceous manner." The *chef d'œuvre* of the art of sculpture in Lombardy in the 15th century,— the work probably of one of the masters who decorated in terra cotta the cloisters of the Carthusian Monastery,— is the 'Dance of the Angels' in the vaulted ceiling of the cupola of the Portinari Chapel in Sant' Eustorzio at Milan. Agostino Busti, called "*Il Bambaia*," was an exponent of all the characteristics of the Lombardy school of sculpture in the 15th century, showing himself, however, insatiable in the adornment of his statues and in the decoration of his monuments. From northern Italy the art of sculpture was introduced into Sicily by Pietro di Bondate, Francesco Laurana, and above all, by Domenico Gazini, the master of a school that filled Sicily with statues until well on in the *Cinquecento*. Antonello Gazini, architect and sculptor, was extraordinarily industrious and productive, ever displaying the native grace and restraint of the *Quattrocento*. Mantua in the *Quattrocento* gloried in Sperandio; Modena in Guido Mazzoni; Bologna showed signs of vitality after there came within her walls the brothers Dalle Masezze, Jacopo della Quercia, Niccolò dall' Arca di Bari, called oftener Niccolò dell' Arca, 1414–94. Sperandio, Andrea da Fiesole and Francesco di Simone da Fiesole, whereupon painting began and attempted to represent the noble figures of Francia.

At the commencement of the *Cinquecento*, differences in art in the various regions of Italy disappeared. Masters who reflected social life adhered to the costumes of their contemporaries, and displayed the most minute attention to detail and truthfulness in individual portraiture, were superseded by those who represented traditional costumes, general academic forms and typical truth to type. Spontaneous art was forsaken by the artists enamored of Raphael's lyrical mannerisms and also by men who found inspiration in the epic grandeur of Michelangelo's decoration in the Sistine Chapel, that most consummate evidence of *Quattrocento* art. A great national artistic unity began to take definite form, due mainly to the predominance of classical antiquity in the new art. The pagan world which art revived represented submission, oppression and inaugurated the Decadence; the word "*rinascita*" "Renaissance" uttered by Vasari [that writer on art and artists from whom so many borrow L.H.] believed he saw the salvation of the art in the *Cinquecento* in imitating classic antiquity, expresses for us the arrest of Italian artistic vitality. When this vitality began to wane, art had become a servile imitator and sacrificed itself on the altar of classicism. The geniuses (the last sons of the *Quattrocento*) having disappeared and formula was substituted for sincerity. Raphael seemed everywhere triumphant, imitated by a host of artists; but his sweetness was not to be found in the frescoes of those who copied him. It seemed as though Michelangelo was to

dominate the world; but the statues made by his nimble, acrobatic imitators lacked the strong breathing-power of his athletes and the terrible grandeur and solemnity of his imagination. Thus art, towards the middle of the 16th century, appeared to be almost completely devoid of inspiration. Imposing masses were used to produce astounding effects; feeling the chill of immense spaces, they attempted restlessly to enliven them with strong chiaro'scuro effects and forthwith began to twist, contort and torture all forms. They invoked grace and made a grimace; they sought to clothe themselves in great magnificence, but succumbed under its weight; they endeavored to imitate the antique and produced only a parody thereof. They were co conventional that truth was effaced and imagination played no part. This art, which no longer followed nature, was bowed beneath ponderous reminiscences, like a wrinkled old bombastic glutton.

The neo-classicists of the *Cinquecento*, the Peruzzi, Antonio da Sangallo the younger, Sannicheli, Jacopo Sansoverino, Jacopo Tatti, better known, from his master, as Jacopo Sansavino, built edifices of antique solemnity. The old formulas of the ancient orders of architecture were not, as yet, rigidly observed, and architecture had still its appropriate colors. The Veronese, Palladio, alone constituted a sort of Roman authority; called, as he is "the founder of modern architecture" his was but a masterly revival of ancient styles.

The *Seicento* (17th century), as if in reaction against the cold art of the mannerists of the end of the preceding century, chose strong contrasts of light and shade, delirious and dizzy forms. On account of this bewildering art appealing, as it did, to effect, to this magnifying of things, to this superabundance of material, ancient art, the flower of civilization, was cast aside. Even sculpture, under the followers of Michel Angelo in the *Cinquecento* seemed to be going into decay. Emilia, however, had still the terra cotta frescoes of Antonio Begarelli; Venice was adorned with the works of Jacopo Tatti (*Il Sansovino*) and with the busts of Alessandro Vittoria, who rendered in plaster and marble portraits of Venetian noblemen, rivalling the pictures of Titian and Tintoretto. Painting in the *Cinquecento*, after the decline of the great generation that issued from its threshold, daily became weaker. Florence, after Fra Bartolommeo who was the first, it is believed, to use the lay-figure, and Andrea del Sarto, called "Andrea the errorless," so faultless, then, seemed his work, triumphed no longer; Siena, after having enjoyed fresh glory from Sodoma and from its Peruzzi, became insignificant; Parma lost its elegance after the death of Francesco Ferrara; and Mazzola better known as Parmigiano, the two Dossi being artistically exhausted, the city's quondam splendor became but a memory. When the followers of Leonardo disappeared and when Solario, Luini and Gaudenzio Ferrari died, Milan closed its school of painting. Venice, which like other Italian cities, had been tardy in art development, advanced the more rapidly in her triumphal career. The contemporaries of Titian, among them Palma Vecchio and Sebastiano del Piombo, Lorenzo Lotto and Bordenone, continued the great Venetian traditions, while Bonifacio, Paris Bordone, Moretto da Brescia, Paolo Veronese, Gian Battista Moroni, da Bassano transmitted them to all the *Cinquecento* through their followers.

At the close of the *Cinquecento* when Florence had exhausted her strength and Venice no longer showed her brilliant, glorious, Oriental coloration, Bologna and Naples, which had until then been inferior in artistic development began to dominate, one with the "eclectic school" of the Carracci, the other with the naturalistic and forceful school of Michelangelo da Caravaggio.

The man who appeared to personify in himself all the art of the *Seicento*, the most versatile that Rome had seen since Michel Angelo, was Lorenzo Bernini. In architecture he retained the monumental feeling; he glorified Michel Angelo unconditionally as an architect and despised Borromini, who, he said, instead of being inspired by the human form, established rules based on illusions. He considered round forms, or those described within a circle, as the most perfect and particularly admired contrast, observing that things do not appear as they really are, but that their appearance is due to their surroundings. Bernini looked at architecture as an art allied to sculpture; and in architecture, as in sculpture, he saw with correct eyes. Bernini was the architect who founded modern Rome.

Bernini brought pictorial knowledge to his sculpture, and his chisel passed over drapery, flesh and hair, ever changing facial delineation, ever varying the tonal effect, but never satisfying his inner vision. Sometimes he broke, and in rage, the sketches of his figures; sometimes in lighter mood he spun hair so soft it waved in the wind. The polishing of the marble would make his figures flabby and pendulous; the draperies swelled like willows in a storm, lashing the figures and strangling them. Bernini seems like an architect who strives to correct nature, which is too weak and contemptible for him who desires to make it gigantic in order that it may impose, subjugate and blast. Bernini has been called the Rubens of the chisel. He is also said to examplify the Jesuit style — the "*Baroque*" — and to have pandered to the poor taste of his day for favor and fortune, while he was the arbiter in all art matters in Rome.

The plan of the Carracci was to return to the antique, but they only gathered the reminiscences of a by-gone great art, to reunite them in eclectic formulae, instead of producing a new, harmonious, potent style. The triumvirate, Annibale, Ludovico and Agostino Carracci, created an Academy of Design, the first type of all academies of fine arts. Endowed by nature more highly than the others Annibale left in the Farnese Gallery in Rome the most splendid example of decorative art of the 17th century. In the princely palaces of Italy, in the vast churches of the Jesuits entered the art of the Carracci to exalt God and man in a language full of eloquence, amid the odor of incense, gaudy gold objects and a throng that was moved by the surrounding *baroque* statues. The efforts of the Carracci to impart dignity and vigor to the ancient tree of Italian art were not in vain; for the school produced Guido Reni, who painted Christ with the crown of thorns, his eyes languishing in pain and sorrow, as though his spirit were striving to return to the light. Albani, painter of cupids, gallant

swains, frail nymphs, coquettish graces; Domenichino, a *Quattrocentisto* astray in the *Seicento*, timid among his bold contemporaries, conscientious among so many that were careless and slovenly; Guercino, who wrapped his compositions in gloom, enlivening them here and there with rays of light; and Lanfranco, who placed colossi on arches and cupolas, were also products of the Carracci school.

In Naples were other eclectics of greater technical force who painted under Caravaggio and Ribera, the former the "King of the Darklings," the latter a Spaniard, known in Italy as Spagnoletto. Here, too, was the prince of modern landscape Italian painters, Salvator Rosa. In Genoa the eclectics were Bernardo Strozzi, a disciple of Caravaggio; and Benedetto Castiglione, a student of Van Dyck, the great Fleming. This master influenced also a Sicilian painter, Pietro Novelli, called *Il Monrealese*. Tuscany had her eclectics, the more famous among them being the "sweet Carlo," Carlo Dolce and the antiquated Pietro Berretini da Cortona, the last-named a decorator who was vulgar, incorrect and mannered and whose work hastened art's decay.

When, at the dawn of the 18th century art began to degenerate, it became gayer, assumed smaller and more cheerful proportions, became sinuous as ivy, twined itself like ivy, moved like a snail, became sketchy, issued in spurts, poured itself forth in sentimental cascades of Arcadia. Human figures lost their bones and were released from the prison of enormous mantles of marble amid rocks and clouds, with hair streaming in the wind, their arms in awkward and convulsed gesticulation. Then it was that classical antiquity beckoned anew, a siren luring the modern artist. Pope Benedetto XIV from his throne outlawed the crusade for classicism; and Winckelman suddenly sounded a call to arms around the Greco-Roman *simulacri*. The antique entered brusquely into the midst of the crowd of *cicisbei*, and advanced with a frown and looking grave, severe and dominating amid the uproar of knaves. It was proper then that art, lacking high ideals, should turn to social life, renewing affectations, but also collecting a treasure of observation and of truth in the hands of Leone Ghezzi, of the Longhi and others. Erudition, philosophy and science entered to arrest art in its search for reality, and Winckelman, with his idealistic enthusiasm for antique beauty, united all in admiration of that civilization which in Pompeii and Herculaneum arises like a phœnix from its ashes. An exponent of classic art and the founder of scientific archæology, Winckelman was a great German art critic living in Rome.

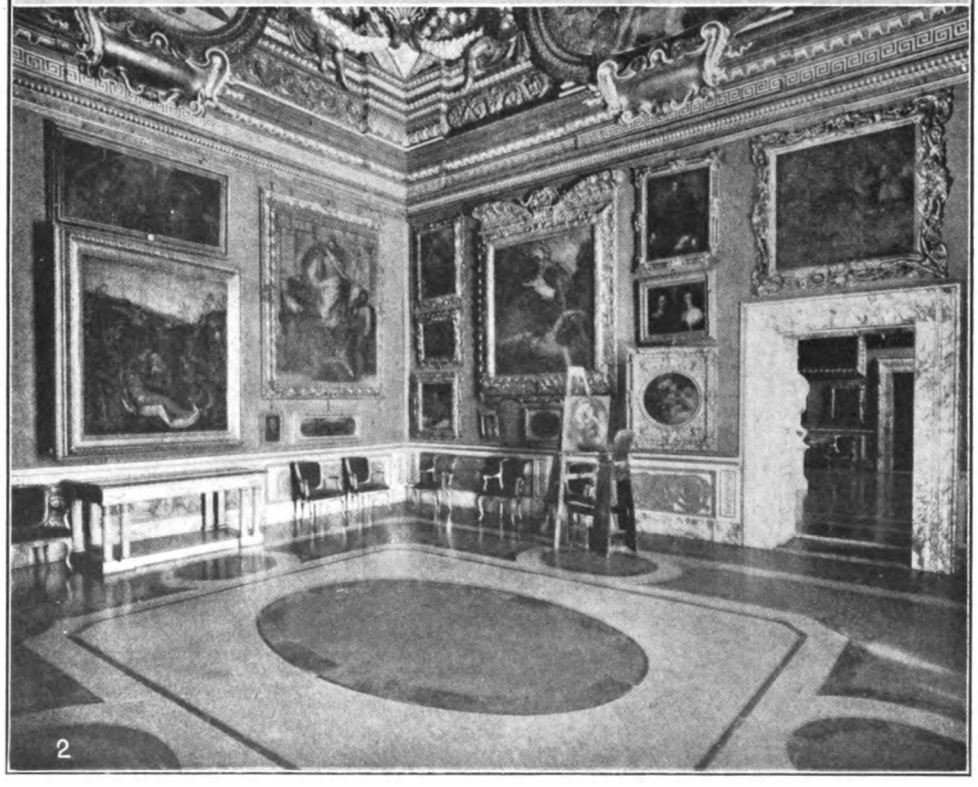
Decorative painting in the *Settecento* (18th century) had displayed its splendors in Venice through the brushes of Gian Battista Tiepolo, Piazzetta and Sebastian Ricci; but in that century there was, in general, a division in artistic work; some were landscape painters, among whom Zuccarelli, a Venetian is admired; others were painters of ruins and architectural compositions, the best of these being Giovanni Paolo Pannini; and still others painted flowers and fruit, and street scenes. Of these last Antonio Canale called Canaletto. Bernardo Belloto and Francesco Guardi were unsurpassed. Ippolito Caffi, killed in the Battle of Lissa, 1866, was probably the last follower of Canaletto.

In 18th century sculpture, Canova was representative of his school, even in its varying tendencies. A terra-cotta relief in the seminary in Venice, shows this master's youthful fondness for the *baroque*. Subsequently his style was expressed in an assimilation of the antique. He persuaded himself that it was necessary to look at nature "with the eyes of antiquity." But the blending of the antique with the new art was, until the end of the *Settecento* (18th century) the dream of artists and scholars. To depict faces in whose profiles the forehead and nose were a continuous straight line; the forehead *brevis* of Marziale or *tennis* of Arazio; the forehead of the same length as the nose and equal in length to the rest of the face from the nose to the end of the chin; to arrange the hair in a curve so as to make the face oval, to mark the fine eyebrows, to round the chin gracefully; —all this was to construct the human body on an algebraic formula. Hence appeared expressionless faces, oval in shape, with soft effeminate cheeks, the surface of the face rounded and smooth, with curls on the forehead and carefully twisted tresses. These heads did not breathe, but grew artificially in a hothouse, without the warmth of imagination, without the rose of life. Classic art was a fossil tree that can no longer delight men with its shade. Canova hoped that he might cause the trunk of this tree to send forth sprouts and burst into green foliage again; and full of impulse for classic beauty, he began one of the many return movements towards the antique which so often started in Italy, at every advance of civilization, all of which have been fruitless. From time to time the tide of Italy's seas ebbs and flows to antique shores, where there are no longer sirens, tritons or nereids.

In vain do we attempt to construct new triumphal arches, basilicas and theatres on the Roman model; the opulence and Roman sense of empire are lacking. The various parts of the edifice may have corresponding proportions, measurements marked by square and compass according to the antique; but the whole result is mechanical, material, pallid, cold. All the ornamentation is volute as with the Roman; but it has no color and falls into identical stereotyped forms.

The decorative painting of the Appiani attempted to recall to life the grotesque figures of the Roman *thermæ* and of the houses of Pompeii; but they were meaningless in their conventional elegance. All this art passed like a comet which obstructs the light of the sun only to leave long trails in the wretched art productions of the 19th century.

The *Ottocento* (19th century) was the century of archæology. The art of the past was persistently recalled; but neither the Cincinnati nor the Coriolani created by the art of the kingdom of Italy; neither the lords and ladies under the dazzling Roman sky nor the saints of the Pre-Raphaelites with heads in a frame of gold fastened to their dress can express the new life. At times art idolized classic beauty, and again contorted itself in the neo-Gothic spears; now it had mystic fervor; now it became concupiscent; sometimes it turned towards the graceful *Quattrocento*, sometimes toward the solemn *Cinquecento*, or the ponderous *Seicento* or the unrestrained *Settecento*. Thus the art of the past century is without unity, its aims are unde-



1 The Loggia, Florence

2 Hall of Saturn, Pitti Palace, Florence

1 The Piazzetta, Venice

2 The Rialto, Venice

fined and its only progress is technical. It would seize upon the past as a plank of safety or it would take refuge in the kingdom of dreams and sail without a compass. But having achieved technical progress and being persuaded that counterfeits of the antique are valueless, having abandoned academic ecclesiasticism and feeling the need of adaptation to the sentiment of the common people, Italian art is preparing to speak the final word.

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25. ITALIAN ART IN THE 19TH AND 20TH CENTURIES. Whenever sculpture and architecture did not progress hand in hand with tempera and oil painting in this birthplace of art, Italy, it will nearly always be observed that either sculpture or architecture was the first to arrive at the acme of development, while the sister art of painting lagged behind.

In the early part of the 19th century there was much activity among Italian sculptors, but this revival, if it may be so called, gave no indication that Michelangelo, Donatello or Verrocchio were to have successors or rivals. Indeed, during the last hundred years the rise and growth of sculpture bear the same relationship to High Renaissance productions as 19th century paintings do to the canvases and panels of the *Cinquecenti*.

Modern Italian sculpture may be said to begin with Antonio Canova (1757–1822), who in his day was the acknowledged European master of the chisel, a position he kept unchallenged for 40 years, although this "soft Bernini," as he has been called, usually failed when he attacked large and virile subjects.

Pietro Tenerani (1798–1869) followed Canova's style, but was much influenced by and shared commissions with Thorwaldsen, the Dane. This indefatigable and clever sculptor often worked the night through, chisel in hand. Tenerani grew rich, honors came to him from royalties and he was made director-general of all museums and galleries in Rome. In 1876 at an exhibition of his works the astonishing number of 450 were shown.

When Romanticism followed as a matter of course the period dominated by Canova's marbles, more variety was seen in the choice of subjects: Stefano Ricci is noted for his monuments; Lorenzo Bartolini, although somewhat of a revolutionary, for his classical tendencies; and Luigi Pampaloni for his delightful renditions of children. Pampaloni is also represented in the cathedral of Florence by two majestic figures.

Pio Fedi, goldsmith and engraver too, is celebrated for his statue of Pisano in the Uffizzi; but the work by which he is best known is the "Rape of Polyxena," replicas of which were desired by art patrons for presentation to the public park in New York and in Boston, but Fedi refused to duplicate his work. Not all of these men were at all times Romantic, for naturalism and realism were insinuating themselves into Italian chisels as well as into the brushes of painters in Italy and, for that matter, in France, England and America.

Giovanni Dupré was more original than his contemporaries. A devout Catholic, his subjects are chiefly religious; nevertheless, his masterpiece is the Cavour monument in Turin. Vincenzo Vela rose from a quarry-boy to be a distinguished artist; he was dramatic and forceful and is best known by his "Last Days of Napoleon," purchased by Napoleon III for the French people and a fine replica of which is now in our own Corcoran Gallery.

E. Ximenes was technically excellent, and the Lombard — Odoardo Tabacchi was not only an eminent teacher but the sculptor of many statues for the Milan Cathedral.

Baron Charles Marochetti, whose parents were French and whose *capo d'opera* is the equestrian statue of Emmanuel Philibert, in Cagliari, the capital city of Sardinia, is represented by many and noble works in France, England and Scotland, besides the monuments in his adopted country, Italy. On the Arc de Triomphe de l'Etoile in Paris is his splendid relief "The Battle of Jemmappes."

Scipione Cassano and Giuseppe Grandi are both excellent technicians; the former best known for his lifelike figure of Pietro Micca, the latter for his monument of "The Five Days" and a beautiful statue of Baccaria.

Medardo Rosso, "the Mefisto of Italian sculpture," is Rodinesque, but has more distinction than the great Frenchman and has thrown away all the conventions of sculpture that have descended from Grecian times. Velasquez's pictures seem to have impressed upon him a dignified gravity, but some of his recent work has been so extremely lacking in detail that its significance is far from the comprehension of the ordinary layman who loves art and even of those who devote themselves to its study.

The scholarly and authoritative article on Italian Art by Professor Venturi brings vividly before us the splendid array of masters from "the Lighthouse of Art" as Giotto was called, to the time of sudden and swift decay. The days are not yet passed when a great gallery of art is not ranked by critics and laymen according to the number of the Italian masters on its walls. But, dominant as Italian art was before, during and after the High Renaissance, just so impotent or dead it was during the 19th century, a time which saw in Great Britain, on the Continent and in America such tremendous movements in art and the advent of such radical changes. Even when Italians again take up the brush once wielded by such magic hands as those of Giorgione, the Bellini, da

Vinci, Titian, del Sarto, Moroni,— to name only these,— it is to but follow the Düsseldorf School, the Munich School, the story-telling schools and the *chic* Parisian "gems," wherein grisette and soubrette attract by their "prettiness."

The mystic English brotherhood, heralded by Ruskin, went to the Italians before the days of Raphael for a sincere basis for their art. Our modern Italians took no part in any such movement, unless the adoption of some of the non-vascular style of the Nazarenes can be stretched into the statement that they followed the Pre-Raphaelites. There is a strange similarity in the kind of painting and in the choice of subject that stamp the beginning and rise of the American School of painting and that of the Italians who (in Italy) devoted themselves to painting within the past century, due, no doubt, to both groups drinking from the same (Germanic) fountain,— the academic. Within the last two decades all has changed; sculpture and painting show the influence of the great *motifs* animating the Barbizon men, and also that of Rodin, Manet, Whistler and the Luminists.

Centuries ago there was a *renaissance* in Italy. There are now signs of another, at least in the art of painting, for Italy has been called the "grave of painting" in that great century, the 19th. From the mass of men who painted during that era conspicuous for its myriad mechanical and archæological discoveries, few names there are that will linger in records of art. Roman civilization dominated art still, the more so because of exhumation of her long-buried treasure both plastic and pictorial.

There was Carnevali, the eccentric, known as Piccio; the two Induni, Domenico excelling in genre, and Girolamo in military subjects; and Cremona, who was perhaps more technical than the Romanticists.

The turbulent Morelli (1826–1901) had a life resembling that of Salvator Rosa. He may be said to have founded the Neapolitan School of brilliant, dazzling, Fortuny-like color. Morelli may have been swayed by the pale school of the Nazarenes, but his pupil, P. Michetti and the younger Italian element were under the influence of Mariano Fortuny, a Spaniard painting brilliantly in the French manner in Rome, whose pictures were "fêtes of the sun." Among this last-named group is the joyous Favretto, who has been likened to Guardi. His paintings are full of life, animation, splendor and truth. His colors are more tonal than the Spaniard's and his art more robust. His brilliant career was ended before the age of forty.

A. and T. Conti and F. Vinea worked in the meticulous way of Meissonier, painting furniture, costumes, tapestries and the like with astonishing facility, and little else.

Scaramuzzo, illustrator of Dante, who also painted portraits and historical scenes; and Luigi Serra, a close observer of nature, must be named among the dextrous draughtsmen in the Italy of to-day.

One of the first men to break away from Romanticism was the erratic and poetic Fontanesi, who seems to have felt the solemnity of Barbizon.

Boldini, too, came under the thrall of Parisian, Manet-like fondness for flat color. The figures in his portraits are attenuated almost too much for the effect of the distinction he seeks; and yet one is reminded of Velasquez, from the predominance of lustreless black that were monotonous save for an occasional spot of rose or red, as in his portrait of Whistler.

Professor Simonetti, a pupil of Fortuny, and G. de Nittis, a pupil of Gérome, produced chiefly genre subjects.

"Giovanni Segantini," says Muther, "demonstrates that it is possible for a man to be an Italian and yet a serious artist." The genre canvases of the horde of merry-making, almost *opera bouffe* painters were relegated at once to obscurity when Segantini painted his peasants. In cool gray colors he painted in the high Alps, straightforwardly and sympathetically, the poor, the miserable, the afflicted and the unhappy. Segantini is a sane Impressionist and Luminist; full of sentiment he is never sentimental. The great fascination for artists in Segantini is his mastery of the line and its rhythm or cadence.

And finally, now that the 20th century art movement is well started, now that art is less national and more cosmopolitan, it is gratifying to see the young painters in Italy producing canvases that are neither reminiscent nor mannered, but work that goes to prove Whistler's dictum: "There is but one Art."

Francesco Sartorelli loves boats and shores as the Hollanders do, and the cluttered waterways, tows, festoons of masts and shipping at rest for the night. All these he paints simply and largely.

Pietro Fragiacomo gives vaguely-massed impressions of Venice's lagoons and gondolas moored in groups at twilight. His treatment is broad, suggestive and poetical.

A strong and Barbizon-like landscape master is G. M. Zanetti, who has a favorite "placing" of a sturdy, noble tree in the centre of his pictures, dividing the distant light and dramatically silhouetting his central blacks.

A. Milesi is one of modern Italy's many figure painters. He differs from the horde in depicting the prolific peasant-mother mid simple but never sordid surroundings and all without "*Mignardisement*" or sentimentality. He is with and of his people, as is the Frenchman, Jean François Millet.

Beppi Ciardi paints fine cattle in broad meadows and like Troyon, uses the horizontal, undulating line to make the land recede. He is a student of aërial perspective. Guglielmo Ciardi paints moving skies, the broad sea and reaches of land far into it. Less impressive than the others, there is a straightforwardness in his style that recalls John Constable.

E. Tito arranges his spots, lines and masses so as to beautifully "pattern" his picture. Drawing is less to him than the balance of color and the "arrangement" of his *motifs*.

L. Bazzaro has all the feeling for canals and bridges of a modern Fleming; indeed, some of his Venetian scenes might well be in Bruges or Amsterdam.

G. Carozzi is like the gentle Daubigny in his treatment of quiet streams and river banks at close of day; and the versatile F. Cascano is as much at home near the flat dunes by a still sea as on a glacier or in Milan's mysteriously dark cathedral.

The painters, E. Borsa, G. Belloni, A. Patti

and Emma Ciardi show, as the other 20th century artists do, the extinction of national schools and the struggle for idealistic and healthy Impressionism. Their tendencies are not social, ethical or classical, but poetical and, fortunately, popular.

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26. THE NATURAL AND PHYSICAL SCIENCES IN ITALY. Old and young at the same time, Italy combines with the traditions of a glorious past in the field of science and the arts, the untrammelled energy of an overflowing vitality in modern times. She boasts among her sons the genial Leonardo da Vinci (q.v.), eminent as an artist and philosopher, an engineer and a naturalist; and the immortal Galileo (q.v.), an apostle of truth and human progress. And if the former, prophetic and solitary on his intellectual heights, did not exercise a great influence on the development of science, it was the latter, on the other hand, from whom were derived those sciences which on account of their methods are called exact sciences, and who had followers at once in the Academy of Cimento which took as its motto the celebrated "Provando e Riprovando." A member of this academy was Borelli, who applied the laws of mechanics to the motions of animals; and Torricelli, a pupil of Galileo, who invented the barometer and demonstrated the impossibility of perpetual motion.

At the close of the 18th century and at the dawn of the 19th century in Italy we see Galvani, who in 1791 published his celebrated work, 'De Viribus Electricitatis in Motu Musculari'; and Volta, who interpreted the experiments of Galvani with a greater intelligence and gave rise to a new branch of physics, the application of which has contributed very largely, next to the application of steam, to the transformation of our civilization.

Contemporary with the two above mentioned was Spallanzani, who disclosed the secret of fecundation.

The works of the poet and naturalist, G. B. Brocchi, on the other hand, belong entirely to the 19th century. He shows us the geological structure of the Apennines, and in his works on paleontology unfolds ideas which to a certain extent anticipate the theories of Darwin. To the same period belong the researches of Count Amedeo Avogadro, who was the first to insist on the distinction between atoms and molecules, and who discovered the law that bears his name; also the ingenious experiments of Melloni, who, through the discovery that heat rays had the essential characteristics of light rays, made an important contribution to the theory of the unity of physical forces, which had also a valiant defender in Father Secchi. We must also mention Dal Negro, who in 1830 built the first electric motor. Toward the middle of the century, Corti published his 'Recherches sur l'organe d'ouie des mammifères,' in which he reveals the mechanism of the auditory organs, discovering the one that bears his name; Fusinieri, a thinker who has not been appreciated at his full value, put forth ideas that were strangely similar to the most modern theories on the constitution of matter; and Ascanio Sobrero, in 1847, made a preparation of nitro-glycerine, which only 15 years later was made an industrial manufacture by Alfred Nobel.

At the present day the scientific institutes and laboratories of the great universities, and even of not a few of the middle-class and smaller colleges, constitute so many centres of research, which, aside from their value to the professors of the special branches of science, furnish their assistants and collaborators and others (outside students), also the younger graduates of the universities, with their first equipment in the field of scientific research. The government observatory of the Collegio Romano (the old Jesuit college) at Rome; the observatory of the College of the Vatican; those of the Collegio di Brera at Milan, of Arcetri near Florence, of Genoa, Turin, Padua, Naples, Palermo and Catania, all of which, however, are not equipped with modern instruments, and others of minor importance, are zealously and earnestly devoted to the study of astronomy and celestial phenomena, as well as to meteorology and physical geography. In connection with these last two studies there are numerous allied institutes of which we will first mention the Central Bureau of Meteorology and Geo-dynamics, which was established by Pietro Tavchini and was under his direction for many years, and is now under the direction of L. Palazzo. This bureau, besides making daily weather forecasts by aid of the regular observations of a vast chain of meteorological stations, gives incentive and impetus to allied scientific research. There are, besides the observatory of the Collegio Romano, which is connected with the above-mentioned Bureau of Meteorology, the observatories of Rocca di Papa and of Vesuvius, established specially for the study of seismic and volcanic phenomena, the observatories of Mount Cimone (7,020 feet above sea-level), of Mount Etna (9,587 feet) and of Mount Rosa (14,820 feet). By means of its meteorological bureau Italy has been able to join the international organization for the concerted universal study of seismic convulsions, and on the other hand the organization participates with the Italian Aeronautic Society and the military Aeronautic corps in international aeronautic ascensions, from which meteorology derives the greatest benefit. There are similar institutes for botanical instruction and study, the first of which was founded in Italy in 1545.

Finally we will mention an institute which, thanks to the noble initiative and generosity of a stranger, arose on Italian soil, and is destined to pass entirely into the possession of Italy. We allude to the Zoological Institute at Naples, which was founded in 1870 by a German, Anton Dohrn, for the study of marine fauna and has become a model for similar institutes which have since been established at other seacoast towns. It is now being enlarged by the addition of another laboratory for the study of the physiology of marine animals.

In addition to the attention paid to scientific research in the universities and other institutes above mentioned, the scientific life of modern Italy displays itself in the academies, which according to their statutes should gather in themselves whatever there may be of note in

the intellectual ranks of the country, or of any of its provinces, and in the special associations which, in turn, seek for affiliation and exchange of ideas between students in the same branch of science. We shall name among the academies, some of which have already been in existence for a long time and are rich in glorious traditions and illustrious names, the Accademia dei Lincei in Rome, the Istituto Lombardo di Scienze e Lettere in Milan, the Instituto Vento di Scienze, Lettere e Arti in Venice, the Academies of Turin, Naples and Bologna. Among the scientific associations we may mention Società Italiana di Scienze Naturali, the Società Geologica Italiana, the Società di Fisica, the Società Seismica, the Società degli Spettroscopisti, the Unione Zoologica, the Società per l'Entomologia, la Malacologia, etc. In addition to the transactions, memoirs and reports published by these academies and associations, scientific information is placed at our disposal by the publication of numerous technical journals, among which we may mention the *Annali di Matematica, pura ed applicata*, the *Gazetta Chimica*, the *Archivio Zoologico*, the *Nuovo Giornale Botanico*, the *Annali dell' Ufficio Centrale di Meteorologia e Geodinamica*, the *Rivista Italiana di Paleontologia*.

Passing now from institutions to men, from the work to the authors, and beginning according to ancient custom with astronomy, Italy of our own day gives us men who have acquired a merited celebrity even beyond the confines of their country and outside the circle of their co-laborers in the same path of science. Temple, a native of Germany, who from 1875 until his death in 1889, was the director of the observatory of Arcetri near Florence, was a keen observer and an unwearying discoverer of comets and of smaller planets. Father Secchi (1818–78), who gained a world-wide reputation for the astronomical observatory of the Collegio Romano, of which he was the director, devoted himself to the systematic study of the spectra of the fixed stars, of which he made the first rational classification, based on the characteristics of their light rays. To Schiaparelli (b. 1835), the genial astronomer of the observatory of Brera, we owe the discovery of the relations between falling stars and comets, a long series of exact studies relating to the planet Mars, of which he designed the first chart subsequent to the observations made by him during the planetary opposition of 1877–78, and finally, the establishment of the fact that Mercury and Venus in a manner analogous to what we know in regard to the moon, complete their revolution around the sun in the same time that it takes each of them to perform a complete revolution on its own axis. Tacchini (1838–1905), an unwearying organizer, took the initiative, or gave the impulse, in the establishing of scientific and astronomical societies. In his own personal studies solar physics predominated. He devoted himself to observing the most important solar eclipses of the year 1870 and later, and discovered the white protuberances in addition to the red protuberances. In the same branch of science we have an accurate and efficient investigator in Riccò (b. 1844), who devoted his attention to terrestrial physics, and especially to the study of Mount Etna, in which field he was preceded by the two Gemmolaro and by Silvestri, and earned the name of biographer of the great Sicilian volcano.

The activity of Vesuvius, on the other hand, was observed and made the subject of study for many years by Palmieri (1807–96). He was also one of the first to apply exact methods to the investigation of the phenomena of atmospheric electricity. And as this brings us into the domain of meteorology, we must mention Father Denza (1834–94), an earnest worker and investigator, who made noteworthy improvement in the perfecting of meteorological instruments, and caused the establishment of regular observations in many mountain stations.

It is scarcely to be wondered at that in a country so frequently devastated by earthquakes as Italy, seismology should have found many earnest and efficient students. Among those who deserve first mention is De Rossi (1834–98), although the tendency of his 'Meteorologia Endogena' to establish a connection between atmospheric and seismic phenomena cannot be said to be in conformity with the objective investigation of the facts. In the modern study of seismology, which pays minute attention to even the slightest movement of the earth's surface, the works and instruments of Agamennone, of Cancani and of Vicentini are of great value.

From volcanoes and seismology it is but a step to geology and paleontology, the fundamental principles of which were conceived, or at least instantly accepted, in Italy, where Leonardo da Vinci saw in some fossil the traces of animals and plants of former ages; where Brocchi, who may be called the father of modern geology, recognized the formation of the Apennines; and where Capellini (b. 1833) as early as 1861 developed his course of lectures on the basis of the Darwinian theory. Pilla (1805–43) deserves mention as the precursor of many others in modern ideas; Meneghini (1811–89) on account of his studies in Italian geology; Stoppani (1824–91), the geologist of Northern Italy, who in his book 'Il bel paese' showed himself a master in the art of popularizing science; A. and E. Gismondi, as at the head of the Piedmontese school; Canavari for his 'Palaeontographica Italica.' In mineralogy we have Sansoni (1853–95), the author of classical works on the crystalline forms of calcite; Bombicci (1833–1903); celebrated outside the domain of his special science as the inventor and streuous upholder of the discharge of cannon as a preventive of hail; Viola, crystallographer; and Artini, geologist.

Turning now to the exact sciences, in mathematics we find Betti, who taught mathematical physics at Pisa; Brioschi (1824–97), who excelled in all branches of his science, and particularly in the theory of equations and determinants; Beltrami (1835–1900), who was remarkable for the clearness and elegance of his deductions; and Cremona (1830–1903), whose works in graphic statics and in projective geometry won him great fame. These were the masters of a host of students who to-day teach and advance their science throughout all Italy. In the present generation we have Dini, who teaches higher analysis; Bianchi, author of

'Lezioni di geometria differenziale'; D'Ovidio and Veronese, geometricians; Volterra, subtle mathematical physicist; Enriquez, a mathematician and philosopher.

In the domain of physics, the seed sown by the undying work of Volta was destined to bring forth fruit primarily in other lands, where Ohm discovered the law of the electric current, Ampère the electro-magnetism, and where Faraday explained induction and the laws of electrolysis. Nevertheless, in every age Italy has given precious contribution to physics. We need only mention Nobili, who constructed the first sensitive galvanometer, of which Melloni made use in his celebrated experiments on radiant heat; Dal Negro, inventor of the first electric motor; Mossotti (1791–1863), whose ideas on molecular force contained the germs of certain theories that were developed later by Faraday and Clausius; Matteucci (1811–68), who conducted many researches on magnetism and on the phenomena of magnetism and induction. Felici (1819–1902), was a pupil of Matteucci, and his researches in electro-magnetic induction, which are admirable for their elegance and simplicity, furnished him with the subject-matter for a theory of induction which is a classic.

In modern times we name Blaserna, who established the first modern institute of physics in Italy; also Roiti, to whom we owe one of the first exact experiments determining the unity of electrical resistance; Pacinotti, who as a young man invented an apparatus that later, under the name of Gramme's Ring, became the characteristic part of dynamo-electric machines and of electric motors with continuous current; Battelli, unwearied investigator and unexcelled instructor. Foremost of all is Righi, a profound experimenter, who, in a series of prolonged researches into the electric discharges in gas, made many observations which anticipated the later discoveries of other investigators, and which have acquired added importance in the light of modern theories. By his studies on the subject of electric waves Righi completed the analogy already made evident by the classical experiments of Hertz, between these waves and the motion of light, and at the same time inspired the first experiments of Guglielmo Marconi. Marconi himself, to whose acute perception we owe wireless telegraphy, must be mentioned in this review; for his work, as well in its beginning as in the later phases of its development, constitutes a splendid application of scientific principles and discoveries, and is a shining proof of the practical value that may be obtained from even the most abstract researches. We must not omit from the list of physicists of the present day, Galileo Ferraris (1847–97), although he was snatched from his scientific labors 20 years ago; for his work, through which originated the discovery of the rotary magnetic field, which has found extensive application in electric motors, is stamped with the imprint of modern ideas.

Chemistry, the sister science of physics, often finds herself face to face with problems which by their nature are related to both these sciences, or which necessitate the use of methods of study belonging to the domain of physics. Hence, there arose an intermediate branch of science, physical chemistry, in the beginning of which Italy also participated when Avogadro formulated his celebrated law which correlates the volume of different gases with the number of the molecules they contain. Cannizzaro, the Nestor of Italian chemistry of the present day, insisted on the exact distinction between atoms and molecules, which was due likewise to Avogadro. In order to determine the molecular weight of composite substances, Cannizzaro made use for the first time of the density of their vapors. The recent progress in physical chemistry, which was inaugurated some decades ago by the study of dilute solutions, and by the application of the principles of thermo-dynamics in the investigation of certain problems in chemistry, was greatly aided by the contributions of Italy in the labors of Paternò and his pupils, and of the schools of Ciamician and Nasini. Cannizzaro's researches on the subject of alcohols are also notable. The labors in organic chemistry of Ciamician, excellent as a teacher, are also celebrated, as well as his studies, carried on in association with Silber, on certain chemical actions of light. Nasini is another brilliant teacher, who has recently made a study of the gases and radio-active emanations of the thermal springs and baths of Italy. Finally, in the domains where chemistry is auxiliary to other sciences we must mention Selmi, who discovered the ptomaines, and Guareschi, who contributed greatly to legal chemistry.

Among modern zoologists Italy can boast of Grassi, who discovered the secret of the propagation and metamorphosis of the eel, and by means of his celebrated researches, carried on in association with Bignami and Bastianelli, established beyond a doubt the fact that mosquitoes, and especially the Anopheles claviger, or large mosquito, are the agents in the diffusion of the parasite of malaria. These researches opened a way by means of which unsuccessful attempts have been made to fight malaria infection (and other diseases that are transmitted in like manner), whether by taking timely precautions against the sting of these insects, or by extirpating the insects themselves by drying up the marshes in which their larvæ abound. Another eminent zoologist, Emery, author of an able manual of his science, has also acquired deserved fame through his monograph on the Fierasfer, and he is equally well known for his exact and diligent studies in the ant world.

In botany, Italy has given us Malpighi (1628–94), who was the first to discover the mechanism of nutrition in plants, and the relative function of foliage. In modern times we have Delpino (1833–1905), an eminently scientific mind and the inaugurator of vegetable biology, which from 1867 he has dissociated from physiology. It is he who by systematic research established the functions of animals, and of the atmospheric factors in the biology of flowers, and who classified plants with exactness, according to the manner of their fecundation. In the past and in the present generation we may mention Parlatore and Carnel, horticulturists; Saccardo, the mycologist, to whom we owe the 'Sylloge fungorum omnium'; and Pirotta, author of a vegetable physiology.

This cursory review of the condition of the sciences in Italy does not pretend to be ex-

haustive. In the midst of the activities and feverish life of a great nation it is difficult enough, if not impossible, to distinguish all the ideas that contain in themselves the germ of future progress, and the calm and impartial observer would find himself at a disadvantage if he should try to classify all intellects and weigh all merits. Instead of being a finished picture which is placed before the reader, this is only a rough sketch — a sketch, however, which while not defining particulars, should give a lively and clear impression of the essential characteristics of the object represented. And, thus, this sketch is intended to indicate whatever there is of enduring excellence or is characteristic in the scientific life of modern Italy.

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27. ITALIAN MUSIC. The death of Giuseppe Verdi undoubtedly marks the ebbing out of the most typical and most glorious epoch in the history of Italian music. From this point of view the date of 27 Jan. 1901, is full of historical importance. With it ends definitely the heroic age of Italian national music, of that art which, particularly in the works of G. Rossini, V. Bellini, G. Donizetti and of G. Verdi, irradiated the world. At the death of Verdi all understood that the legendary age of Italian opera had come to a close forever, and that now it would behoove us to deal in realities. To the heroes, succeeded mere mortals; to the rule of genius, that of technique. What we lost in sublimity, we attempted to gain in profundity; compensation was sought for lack of clearness in the design, by brilliancy of coloring; for the loss of melodious verse, by the intensity of psychological meaning; and local color took the place of passional intensity.

Yet this new art preserved intact some precious characteristics of the Italian race, this art which, while struggling nobly in the midst of surroundings that became each day more refractory and utilitarian, still succeeded in making its influence felt at home and abroad, leaving always a genial impression, and Italian national pride has no reason to be ashamed of it. It is, in fact, an indication of our constant progress in musical culture, which to-day shows a tendency to reorganize itself on broad and healthy lines.

We shall now see how the way was prepared for the actual musical movement, how and when it was outlined, assuming definite characteristics, and what were its successive vicissitudes up to the present time.

Giuseppe Verdi as long as he lived was at the head of Italian musical evolution. Alfredo Catalani, Amilcare Ponchielli and Arrigo Boito were old and authoritative pioneers.

Arrigo Boito, with the aristocratic and complex temperament of a poet and a musician, writing for Ponchielli the libretto of 'Gioconda,' and for Verdi the two splendid libretti 'Othello' and 'Falstaff,' collaborated efficiently in the renaissance of Italian lyric drama. But his most direct and decisive action was in the composition of the score and liberetto of that 'Mefistofele,' which was given in Milan in 1868, and revived in Bologna in 1875. A happy union of classicism and modernity, 'Mefistofele,' together with the last *chef-d'-œuvres* of Verdi had truly a great awakening power.

With his vocal scores, Ponchielli, especially in his 'Gioconda,' divested of obsolete conventionalism and animated by frank human passion, prepared the way for modern realistic melodrama; while Catalani, of the delicately elegiac inspiration, with the Lorey and the Wally, devoted himself by preference to Wagnerian ideals. There are not wanting, then, notable composers. However, the inventive faculty of Italian musicians which appeared for so long to have slept soundly did not awaken until 15 years later in 'Cavalleria Rusticana,' by Mascagni, whose marvellous success was the commencement of a new school, and a new dawn. In the fever of novelty and modernity at any cost, this music gave evidence of the haste with which it had been created, as though it would recover the time that had been lost. With some exceptions it almost always showed the spasmodic effort to attain half results, rather than the serene joy of one who has achieved the fullness of completion. However, many of those works exercised at the time a fascination and continue to do so. Bearing the imprint of a broad modernity they have a happy relation to the indistinct needs of our souls; and if, in their bearing on art and artists, they represent only a halfway house on the wearisome road, to the public they may well mean the revival of opera. Such was certainly 'Cavalleria Rusticana,' in spite of some inequality of style in this melodic flow so limpid and spontaneous, that characterizes it from beginning to end, but especially in the freedom of movement and the freshness of impressions which were to make of these short scenes of Sicilian life the basis of the new musical trend.

After the triumph of 'Cavalleria Rusticana' nothing but realistic melodrama had any success in Italy. The madness of *Carmen* and the plunging of the dagger of *Don José* evolved on æsthetic canons of the powerful and elegant art of Georges Bizet, had already prepared a propitious soil. The love song of Turiddu and the slash of the knife of Compare Alfio did the rest. And here we have the realistic opera with Southern setting invading Italian ground, and the gentlemen with cape and sword retiring in good order before the heroes of 'Mala Vita', of M. Giordano, before the oyster venders of *A. Santa Lucia* of Maestro Lasca, before the Camorrists of *A basso porto*, Maestro Spinelli.

Meanwhile Maestro Leoncavallo, following implicitly the word realism, gained a wide and well deserved reputation with his 'Pagliacci,' while Maestro Cilea with 'l'Arlesiana,' and Gaetano Luporino with 'Dispetti Amorosi' and the 'Collana di Pasqua' were well received, as they also followed the prevailing artistic tendency. It was not thus with Giacomo Puccini, who was already known before Mascagni by his 'Le Villi' and his 'Edgar' of romantic fanciful type. Following these with 'Manon,' with the exceedingly popular 'La Bohème' (his master-piece), with the tragic 'Tosca' and the exotic 'Madame Butterfly,' he accomplished a gradual evolution towards more realistic forms, while maintaining in his art a subtle passionate

fragrance that betrays its far away romantic origin.

We must not suppose, however, that all the younger maestri followed exactly in the steps of Mascagni, Puccini and Leoncavallo. Each of them studied to invent something new, but in his own manner and according to his own ideas. Thus Alberto Franchetti, in his 'Asrael,' showed himself from the first to be a romanticist of the romanticists, enamored of Wagner and of the German school to which he belonged by virtue of the exact and profound study he had carried on in Germany. 'Asrael,' a splendid example of polyphonic technique, and remarkable for its brilliant orchestration, gives the gauge of Franchetti's talent, that loves grandeur rather than simplicity, and places him readily in the foremost rank. In truth, Franchetti, together with Mascagni and Puccini, completes the famous triumvirate of younger maestri, who for some years have been the sole representatives of the most modern musical school.

But others, and not a few, may be added to those already mentioned, and they must be noticed here to complete the character of this first period, full of activity and illusions. Among the works that deserve special mention are 'Hero and Leander,' by Luigi Mancinelli; 'Lorenzo,' by Mascheroni; 'Maruzza' and 'Colonia libera,' by Floridia; 'Christ at the Feast of Purim,' the remarkable philosophico-social drama by Giovanni Bovio, set to music by Maestro Giannetti; and besides these, 'La Pellegrina,' by Clementi; 'Ratcliff,' by Pizzi; 'Savitri,' by Maestro Conti; 'Festa a Marina,' by Coronaro; 'Celeste,' 'Gringoire' and 'Cortigiana,' by Scontrino and many others upon which the attention of the public has been centred, but only in fleeting fashion.

Considered as a whole, this first period of the modern movement in music had, therefore, a prevailing characteristic of realism, as is shown in the selection of subjects, and in the form of the libretto. All of which does not prevent this predominant school with the Bizetian (Bizet) characteristics from being met in the field by an almost contemporaneous school with Wagnerian proclivities, represented by Franchetti, Conti, Mancinelli and a few others. It was natural that the two schools should mutually exercise an influence on each other, and thus it happened that with reciprocal advantage the external differences in subject-matter and form finally disappeared and we come to a second period which represents the fusion of the two schools. A new program seems to have been substituted for the ultra-realistic and ultra-romantic order which had served their time, and the new program had a higher conception of dramatic environment and of a technique on a broader basis. The first honors in the bringing about of this evolution belong again to Mascagni, Puccini and Franchetti. Already in 'L'Amico Fritz' and even more in 'Ratcliff'—a profound artistic conception — Mascagni knew how to inspire crude realism with a breath of sublime poetry. And if Rantzau, Silvano and Zanetto had caused a halt in his upward career, 'Iris' came just in time to reawaken the former confidence of the public. The dramatic action of 'Iris' is a curious and strange blending of the real and the fantastic; but Mascagni's inspiration gave it new treasures of harmony and orchestration, which made this opera the worthy rival of 'Cavalleria Rusticana.' Puccini met with similar favor in his 'Tosca,' with its gloomy and violent coloring, but strongly passionate style. Franchetti, after creating in 'Asrael' and 'Cristoforo Colombo' splendid, fantastic and historical pictures, attempted with a happy touch to portray modern epic sentiment in 'Germania.' Leoncavallo, after making in his 'Medici' an incursion into the field of the great historical drama, and then coming back to realism in his 'La Bohème,' gave us in 'Zazà' the modern passional opera on intimate social lines. Meanwhile in 'Chénier' and 'Fedora' a new and strong temperament in opera was revealed in Maestro Giordano, who, in these much praised works showed himself to possess the theatrical vision. Finally, Maestro Cilea in 'Adrienne Lecouvreur' succeeded in captivating completely the attention of the public.

Taken altogether, the productions of this period are found to be better constructed and more balanced than those of the preceding period. The almost excessive seeking for direct scenic effect, which was the evident outcome of the choice of highly sensational subjects was now largely replaced by a greater nobility in style. However, we are not considering a sporadic condition of our lyric drama, but actual characteristics common to all composers and which became more markedly evident in the third and more recent period of our operatic activity.

The success of Cordara's lyric mystery, 'La tentazione di Gesù,' composed upon Arturo Graf's dramatic poem, was a significant sign of the new aspirations.

Another worthy musician, Giacomo Orefice, already known by his 'Gladiatore' and his 'Cecilia,' acquired a deserved fame by his 'Chopin,' in which, with the able help of the poet Angiolo Orvieto, he cleverly portrayed the life and music of the great Polish musician in a lyrical drama; and this fame was increased by his 'Moses,' with its mystically grand, eloquent phraseology and its exalted style. The present output is full of the high conceptions and an effort to develop a more marked national character. This character of nationality is a question of life or death. On it depends whether Italian opera shall be able to reaffirm its traditional pre-eminence in the face of the tremendous competition of the schools of other countries.

Besides opera, which in music is our most typical form and the most complete of our musical activity, there are also other kinds of music in which the Italians have taken honors. Among these is the oratorio.

This form of art, which is, as it were, an imaginary bridge connecting sacred and secular music, is of purely Italian origin. But while it developed most markedly outside of Italy under Bach and Handel, it became popular in Italy towards the end of the 17th century, in a long period of decadence which lasted to our day. To the Abbé Perosi belongs the honor of recalling this noble order of music to new life. The oratorios of Perosi are in fact a happy grafting of dramatic sentiment and improved modern technique on the ancient and glorious stock of Palestrinian traditions. They awaken in the popular mind a deep echo which

appeared to be dying out, and their great success inaugurates a true and important evolution in oratorio construction, which had worthy exponents in Maestro Tebaldini, Padre Ambrogio and Maestro Sonzongo. Oratorio had also a conscientious historian in the young and learned Abbé Pasquetti, author of a book on 'Musical Oratorio' in Italy.

As of oratorio, so also of real and regular sacred music there is much to say. In publishing his famous *Motu proprio sulla musica sacra*, Piux X laid down minute rules not only for the execution, but also the composition of church music, which he desired to bring back to its ancient purity. Among the most severely censured writers of sacred music are Bossi, Gallignani, Tebaldini, Terrabugio and others.

It is unpleasant for an Italian to have to acknowledge that Italian symphonists receive little encouragement. Italy certainly has not the glorious symphonic traditions of which Germany can boast. Nevertheless she has acquired some fame, through Bolzoni, Celega, Scontrino in his 'Sinfonia Marinaresca,' and above all through Giovanni Sgambati and Giuseppe Martucci, the late director of the National Conservatory of Naples, in his highly valued symphonies in "D" and in "F" major.

Also in instrumental chamber music, Sgambati and Martucci have made themselves conspicuous. In this field Italian production is unable to compete with foreigners. However, artistic qualities may be found in the works of Bossi, Buonamici, Adolfo Crescentini, Frugatta, Del Valle, Faini, Enrico Oswald and in three interesting quartettes by A. Scontrini. Among the most recent works those of Zanella, Tarenghi and Brogi deserve praise.

Vocal chamber music has not with us taken on the classical character possessed by the *lieder* (songs) of Schumann and Schubert in Germany; it deals exclusively with ballads and the ballads of Tosti, Rotoli, Denza, M. Costa and E. De Leva are universally known.

The great popularity of Italian singers in other countries obviates the need of mentioning names. There is almost alwavs a wealth of good voices in Italy and there will never be a dearth of those who understand the delicate mechanism of the Italian *Bel Canto*.

The schools of stringed instruments of Milan, Turin, Rome, Naples, Pesaro and Parma enjoy a merited renown, and in general, the musical conservatories of these cities graduate a large number of the finest instrumentalists. But Italian musical instruction is not up to modern standards. And a proof of this is the fact that almost all our best concertists (orchestra players) have studied, or perfected themselves in Belgium or Germany. Besides her orchestra players and her singers Italy boasts of a great number of orchestra leaders of renown, such as Mancinelli, Martucci and Toscanini and the Maestri Mugnone, Usiglio, Ferraris and many others.

Then in the field of musical literature there are talented writers, such as Nappi, Depanis, Franchi-Vernecq, Pozza, Checchi and Monaldi.

In spite of its partial disorganization and consequent scattering of energy, Italian musical art has proved its inexhaustible vitality and its admirable faculty of adapting itself to the new age. But the instruction now given in conservatories should be made more practical and more modern; care and intelligence should be given to the reorganization of Italian musical life, which from the theatre to the concert hall is in a condition of uncertainty and continual crises; and above all, Italian musicians must endeavor to imprint on all their musical productions a more vigorous and more sincere Italian character.

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28. ECONOMIC CONDITIONS IN ITALY. The fundamental traits of the modern economic conditions are similar in the principal countries of Europe and America. Wherever the returns from property are distinct from the returns from labor, wherever simple accumulation is the source of industrial remuneration; the more numerous class of laborers and persons in the employ of others are recompensed with wages, for the most part not commensurate with the productivity of the enterprise. In recent times wages have shown a tendency to rise to a greater or lesser degree above the amount required for bare physical subsistence; and the conditions of workmen have improved also in function of the growth and vigor of their unions and organized insistence on more liberal compensation.

But if the general laws of distribution are uniform, the actual distribution varies in different countries; because of the diversity in the primary economic conditions of the various classes; by reason of the number and relative importance of the fractional parts into which the proprietary class is divided; because of the degree of density of the population and other causes; all of which exercise a greater or lesser degree of influence on the entire social system. Hence, the economics of each nation have their special peculiarities resulting from their specific conditions. In considering these conditions as they exist in Italy, we must remember that as an organized political unit Italy has had less than half a century of existence, whilst as regards the degree of cultivation of the land and country, she is economically ancient. But not until political unity had been obtained was there any considerable development of capital and an increase of industries in the various parts of Italy. The constitution of the new kingdom therefore marks an essential moment in Italian economic history. The accomplishment of political unity which is the brilliant triumph of the past generation has also given a special direction to public finances, which ought to be subordinated to the particular needs of the new collective organization, and in harmony rather with the principle of productive taxation than with that of rates chosen in proportion to the individual revenues and wealth. In addition to this the new state assumed the debts and the deficit of the ex-states, which transmitted to her an onerous burden, about $450,000,000 of public debt, besides $20,000,000 of deficit. The excess of expenditure was augmented by the expenses of war and of civil renovation; the consolidated debt continued to increase largely and the taxes by degrees made greater and more absolute demands on the wealth of the taxpayers. A persistent fight was instituted against the deficit which, from $140,000,000 in 1866, decreased to less than

$30,000,000, and except for a rise in 1870 began sensibly to decline, and in 1875 became transformed into surplus. Trusting too much to the natural increment of revenue and the permament efficacy of transitory expedients, the government agreed to a disproportionate amount of expenditure, and thus, after 10 years, a troublesome period occurred similar to the first, and in order to steer through this the government was obliged to practise the greatest economy, to increase the rate of many taxes, to introduce fresh taxes, to prohibit in the future recourse to the consolidated debt.

This severe political action not only tended to re-establish the equilibrium of the budget, and to the making of advantageous and continuous surplus after 1896–97, but served to give a stability to the Italian budget that richer nations may envy. In 1902–03 the budget showed a realized surplus of $19,800,000; in 1904–05, of above $9,400,000, although an extraordinary but productive expenditure had to be met with the ordinary income. The prices of Italian public stocks in the last mentioned years were maintained above par, so that on 29 June 1906 the government could put into force the law whereby the 5 per cent gross and 4 per cent net obligations for an entire sum of more than $1,600,000,000 of capital were converted into obligations bearing only 3.75 per cent interest and automatically transformable after 15 years into 3.50 per cent, thereby causing a saving to the government of many millions in interest charges. Banking conditions also improved notably, doubtless because in conformity with the provisions of the law of 1894, the reserve funds increased, whilst the industrial and commercial expansion produced a greater demand for bills of credit.

These facts are quite remarkable, but one must not infer merely from the financial prosperity of the government and the sound state of the banking circulation that the condition of national economics is absolutely vigorous. Taxation in Italy is very heavy; its total perhaps equals one-fifth of the annual production, and although the system of public revenue is complete in the sense that it reaches all the direct and indirect sources of individual economics, it is defective as regards elasticity, coordination and is too burdensome upon the most necessary articles of consumption. While the land and house taxes have the character of a real tax, that on the income (ricchezza mobile) is personal, and many relate to profits, interest, honorariums, stipends, salaries; but the fact that this has the character of a partial tax hardly serves as an offset to the severity of the first two taxes. Permanent incomes are taxed at a higher rate than temporary or uncertain incomes; the exemptions are few and the minimum of exemption is low. Another $40,000,000 is obtained from a class of imposts called taxes on business, but the general opinion at present is that they should be reformed as to their acceptation, as annoyances are caused by their collection. Modern progress was only evidenced in 1902 in the taxes on succession, and this is the laudable initiative to a better distribution of the taxation. But it is to be deplored that the food and home of the workingman should be so heavily burdened with imposts. A diminution of the rate of taxation would probably lead to a rapid increase of fiscal revenue, through the expansion of consumption, as occurred recently after the reduction of the duty on Brazilian coffee. But although it would be a benefit to finance and economics, it is not given any consideration on account of commercial policy. The duty on grain is 7.50 the quintal, and if it yields the state a variable, though always a considerable revenue, it places on the taxpayers the heavy burden of about $40,000,000. Added to this pernicious distribution of wealth, owing to the duty, there has been no advance in the cultivation of cereals, and now the average yield of 10 or 11 hectoliters per acre is still small. In this connection it is proper to take into account the number of the agricultural population, which, considering the inhabitants employed in other occupations, amounts to 40 per cent of the whole, while 19 per cent are employed in manufacturing industries, and 4¼ per cent in commerce.

Although the agricultural protectionism was counterbalanced by the industrial protectionism which developed after 1887 and was followed by a period of depression, there may be seen a noteworthy progress in the principal lines of production. The value of fuel for industrial use has increased, the power of steam engines and other motors, among which hydraulic and electric motors take the lead, increases in proportion to the increasing requirements of labor. The production of silk has grown remarkably, especially in the last 10 years, so has the cotton crop, especially the inferior grades; great perfection has been attained in the tanning of leather; and there has been a great increase in the chemical industries.

The bulk of international commerce which, in the two years of 1890 and 1891, was represented by an average value of $420,000,000 a year, increased in the two years 1904–05 to an average of $729,800,000 a year. A small portion of this increase may be attributed to variations in price, and since then we cannot say that there has been any diminution in internal commerce. The indications are significant, and besides agree with so many others that we may draw conclusions, for example, as to the increase in railroads, postal business, telegraphs, deposits in banks and savings banks, etc. But it is certain that the bulk of Italian foreign commerce is small compared with the foreign commerce of England, France or Germany.

An industrial increase may be noticed; but the greater part of these factories are of small production. The average number of employees or operatives in each factory rose to 25 in 1876 and 38 in 1903, allowing naturally for differences in the different branches according to the relative technical requirements.

There are few large fortunes in Italy. Nitti made a calculation that there are from 1,500 to 1,600 millionaires; while in Germany there are about 11,000; in France, 15,000; and more than 30,000 in England. Every year minor inheritances of about $400 compose more than three-fourths of the total number; and those not exceeding $10,000, 98 per cent. The general wealth of $10,800,000,000 in 1885–90 rose to $13,000,000,000 in 1902–03.

In regard to the conditions of the laboring classes, the Bureau of Statistics has shown that

in 1871 the wage per hour on an average might be estimated at 0.171 lire and in 1903 at 0.265 (respectively about 3⅓ cents and 5⅛ cents). Taking into account the price of grain it would have taken a laborer 183 hours of toil during the first period to enable him to buy a quintal of grain; and during the second period, only 91 hours. According to the researches of Signori Geisser e Magrini, the average increase in actual wages in the usual industries was from 86 per cent in 1862, to 192 in 1903, an increase, therefore, of 123 per cent. The variations, however, are many; and if we maintain that today the expert operative commands wages as high as $1.40 to $1.60 a day, the conditions of the inferior workmen is a sad one, especially those that are not organized and who belong to domestic service. According to a census of workmen taken by the Umanitaria at Milan, out of more than 122,397 persons who on 1 July 1903, complained of their wages, 62,201 or 71.45 per cent of the operatives received a wage of 20 to 60 cents a day, and out of these 41,389 operatives, equal to 91.31 per cent less than 20 to 30 cents. In agricultural labor the wages were ascertained in 1901; the average wages, except for temporary increases, are even less than in the industries mentioned, and are reduced whenever there is a lack of work, which so often happens in Italy particularly with agricultural labor.

The increasing emigration (in its whole being of 143,946 or 394 per 100,000 inhabitants, during the year 1916), which comprises for the most part agricultural laborers, must not be looked upon as an indication of absolute poverty, but is rather a symptom of the difference between Italian and foreign wages. It has to a certain extent aided in eliminating the enormous excess of births over deaths, and has promoted savings which go to augment the national capitalization, as the remittances to Italy of the emigrants to United States figured at $22,632,989.98 in 1916, can proportionally show. It has also helped to establish certain forms of agricultural contracts, but it certainly has deprived Italian industry of valuable energy and changed the special demographic constitution of some of the southern countries.

The social legislation makes provision almost exclusively for disabled workmen (pensions for the old and infirm; and for extraordinary emergencies, obligatory insurance against the accidents incident to labor), and by apposite Law of 4 April 1912, a National Institution of Insurances was created with contracts amounting already in December, 1916, to $231,120,000. More extensive provisions have been made to prevent the employment of young children and to shorten the hours of labor. A course of instructive studies was instituted by the Labor Bureau (1904) and there began to be a more rigorous application of the protective laws, which is always more readily brought about by the solid organization of the labor federations. If strikes are still of frequent occurrence, there are not lacking instances of a peaceful settlement of the disputes between employers and employees and the arrangement of mutual contracts.

Independent woman labor is a new economic factor to which the European War gave prominence, so that it will survive in Italy's economic conditions. The secular tradition of the woman being supported in her life by the man, has now completely disappeared, together with any material depreciation of female labor through an antiquated moral prejudice.

It is certain that the progress in industrial civilization and the production of wealth is greater in Northern Italy than in the central and southern provinces, which is probably owing to intellectual and moral causes. There is less illiteracy in the northern provinces than in the general average of the kingdom or in the southern provinces. While in the province of Turin 89 per cent of the population above six years of age knows how to read, in the province of Cosenza — which represents the highest degree of illiteracy — only 30.4 per cent can read (see ITALY — SCHOOLS AND UNIVERSITIES). And as to the criminality, in Sicily and Sardinia the crime of homicide attains its highest figure, more than double that of the rest of the kingdom, and is very frequent in Campania and Calabria; while in Lombardy and Venetia it is at about the same rate as in the most progressive countries of Europe. A decisive decrease has been shown between the years 1909–13 by figures at 2.4 per 100,000 in Venetia, 2.3 in Lombardy, 3.1 in Emilia, 14.5 in Sardinia and 23.2 in Sicily, the proportion of this decrease being more sensible in the southern provinces.

From the fragmentary notes here given, it may be seen that in Italy, wealth and capital, although small compared with that of the more important countries of Europe and America, have greatly developed; that industry has made remarkable progress, more in some regions than in others. Also the wages of the laboring classes, while inferior to those of workmen in other countries, have nevertheless almost doubled in 30 years, although this amelioration does not extend to all branches of the working class. Social legislation is always incomplete, but even here there is more than a beginning of building up and more effectual application of the law.

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29. AGRICULTURE IN ITALY. Italy, by reason of its geographical situation, although in the Temperate Zone, gives us a synthesis of the vegetation of Europe. Next to Switzerland it is the most mountainous country in Europe. Two-thirds of its surface are covered by the mountain chain of the Alps and by the Apennines, and about one-fifth must be classed as wholly unproductive of vegetation, from natural causes. The remaining portion is only partially cultivated, and is only fairly productive in certain portions.

Italy contains the great plain of the basin of the Po (ITALY — PHYSICAL GEOGRAPHY), and the smaller plains which extend along the Mediterranean, in the Pisan, Grossetan, Roman and Campanian territory; along the Adriatic in the tableland of Apulia; and also along the Calabrian, Sicilian and Sardinian sea coast, where they are smaller.

Climatology.— Sicily and lower Italy, as regards the rainfall, have an absolutely littoral climate, with a minimum of rain in summer, and a maximum in winter. The valley of the Po, on the contrary, has an inland climate with two maximums of rain, in spring and in autumn, and two minimums, in summer and in winter. Central Italy has an uncertain climate, but resembles more that of the sea coast, with a maximum of rain in November and a minimum in July. On the Mediterranean slopes the rainfall is much greater than on the Adriatic side. Hailstorms are most frequent in the Alpine zone, extending to the foot of the Rhetian Alps, the Carinthian and the Julian Alps; and in a Tyrrhenian belt extending from the Arno to Calabria; and less frequent in a Paduan belt beginning at the Maritime Alps, the Cotian, Graie and Pennine Alps, and extending to the east as far as the mouths of the Po; and in an Adriatic belt which extends from the Marches to the Salentine peninsula and to Sicily.

Agricultural Regions.— The agricultural regions of Italy may be divided into five: (1) The acid fruit region; (2) the olive region; (3) the vine-growing region; (4) the chestnut region; (5) the forest region, which it is hard to define exactly.

Agriculture presents itself under the most different aspects, as it partakes of the character of northern as well as southern cultivation. Rye, buckwheat, potatoes, chestnuts, are principally cultivated in the Alps, in the Apennines and their spurs. In the rolling country and in the central belt, wheat, maize, grapevines, leguminous seed-plants, hemp and flax are grown. In the plains and in the hilly regions of the most southerly portions olives, almonds and acid fruits thrive, and at one time, in the extreme edge of the peninsula and in Sicily, cotton was a favorite crop.

Principal Crops.— According to statements published in 1916 there were 51,309,310 acres under crops; 11,272,339 acres afforested; "waste land" constituting 7.4 per cent of the whole; tilled land 45.4 per cent; pasture 25.6 per cent; and vineyards and orchards 4.9 per cent. The principal crops in 1915 were wheat, barley, oats, rye, maize, rice, beans, potatoes, sugar beet-root, grapes and olives. A careful analysis of reports of the Superintendent of Agriculture and others which refer to the years 1892–1909 shows beyond question substantial progress in Italian agriculture which is especially noticeable in the last 10 years, and this progress was much more marked in northern Italy (particularly in Venetia and Emilia); it was less noticeable in central Italy; there was little or no improvement in southern Italy and the islands. Large areas of forest lands have been replanted by, or with the assistance of, the government in the last 50 years, and the forest produce amounts in value to $35,800,000 annually.

Breeding of Domestic Animals.— Cattle exceed probably 5,000,000 head, and they continue to increase, especially in upper and middle Italy. Of the Italian breeds the most general is that with the gray saddle which occupies the centre and south of the peninsula. Then come the great Piedmont breed and the red saddle cattle of Emilia.

The islands also have their special breeds. The Sicilian cattle with red saddle are a modicana breed. The other breeds are either mixed or are propagated *nuances* from the Alpine stock of Savoy, of Switzerland, or Austria and these inhabit the spurs of the Alps in the Po valleys and also the plain. Whilst the cattle raisers of the Lombardy plain make a considerable profit in return for the care given to their milch cattle, those of Romagna devote themselves to producing a breed that can be used for labor and for beef. The Alpine mountaineer seeks to put his mountain slopes to a good use by grazing cattle, and the Sicilian cattle raiser experiments with forage plants suitable to the hot and dry climate of the island.

The improvement in breed may be explained by better judgment in the selection of breeding animals, by the more rational manner of feeding and by the importation of high-bred foreign stock, among which the brown saddle Swiss cattle from Canton Schwyz, and those with the spotted saddle from Simmenthal predominate.

The exportation of cattle forms a considerable item in commerce. Switzerland, in 1903, imported over 30,000 head. But the increase in production provides also for the growing demand for home consumption.

Cheese and Butter.— The manufacture of cheese is of growing importance. In 1890, 57,000 cwt. of cheese was exported; in 1905, 171,000 cwt. Of butter in 1895, 44,000 cwt. was exported, and in 1905 more than 60,000 cwt. The Swiss cheese, Emmenthal brand, which are imported in large quantities from Switzerland, are now manufactured largely in Italy, as a result of the study of Professor Moreschi and are of the finest quality, and have become an export.

In Latium and Sardinia cheese made of goat's milk is an important product.

Breeds of Horses.— There are numerous varieties of breeds which, while not losing entirely the characteristic of the stock from which they are derived — and Italy is famous for its horses — have acquired new characteristics from their environment. In upper Italy the horses are bred indoors; in Tuscany, in the south, and the islands they breed in the open. The number of horses must be over 741,739 head, according to the enumeration made by the War Department.

Sheep.— Italy, like all the European states sees a gradual decrease in its flocks of sheep, owing to the extension and amplification of agriculture. A few years ago it was estimated that Italy produced about 12,000,000 kilo-

grammes of wool (worth $4,200,000), with fewer than 7,000,000 sheep.

The breeds of sheep deserving mention are: the Bergamasca, or giant sheep; the Vissana, which inhabit Latium, the Marches and Abruzzi; the Gentile di Puglia; and lastly, the Merinos, and the fat-tailed sheep, or "barbaresca," which are to be found in the islands, and especially in Sicily.

The flocks of central and southern Italy summer in the Apennines, and pass the winter in the plains of the Maremma, of Latium, of Apulia, of Salernitano, and along the banks of the Ionian Sea. Better results in production and a heavier weight of wool have been obtained by breeding with the Merinos of the Rambouillet stock. The export of sheep reaches about 400,000, of which almost all go to Switzerland.

Swine.— There has been a great increase in swine, which are made more productive by mating with the Yorkshire boar. In the south, and particularly in the Campania, the prize breed of Casertana is predominant. In the central and northern provinces the swine of Celtic type, with long snout, convex spine, with long legs, adapted to wandering across the meadows, are to be found. It may be affirmed that there are at least 2,000,000 swine. The raising of pigs is now a flourishing industry and produces an important commercial export. In 1905, 95,000 head were exported directly to Switzerland and Austria-Hungary.

Poultry Breeding is in a primitive state. There are a few successful raisers, but most industrial attempts at poultry breeding have failed. The valuable breeds of poultry are those of the Valley of the Arno, of the Polverara, of Padua, of Martinafranca; but it may be said that every province has some that are valuable.

In 1905 about 93,000 cwt. of poultry were exported; of eggs there were exported in the same year over 331,000 cwt. worth about $13,000,000.

Pigeons.— Large pigeons for food are produced in considerable numbers, especially in the provinces of Emilia.

Exportation of Agricultural Products.— Taken altogether the difference is very small between the total value of the agrarian products imported and of those exported. (See below: ITALY — INTERNATIONAL COMMERCE).

The principal agrarian products exported are: Unhusked rice and raw rice, prepared rice, chestnuts, potatoes, vegetables, greens and French tomatoes, dried vegetables, oranges, lemons, limes, fresh grapes, fresh fruits (dates included), almonds, nuts, hazel-nuts, dried figs, raw hemp, sumac, different kinds of wine in casks, every kind of wine in bottles, tartar or dregs of wine, purified olive oil, preserved vegetables, fruits and greens, preserved tomatoes, essences of orange, neroli, bergamot and lemon, essence of new-mown hay. Cattle, pigs, fresh meat, salt and cured meat, poultry (live and dead), hens' eggs, butter (fresh and salt), cheese.

Irrigation and Improvements.— Whilst in northern Italy irrigation has from ancient times been carried on, in the other portions it is more recent, and not so complete, in others again it is entirely lacking, owing not alone to natural obstacles such as the rugged topographical aspect of the region, and the perennial drought, but also to the persistence of obsolete methods of cultivation. In fact, whilst the valley of the Po is extensively irrigated, and the valley of the Serchio to a great extent, the valleys of the Arno and the Tiber remain neglected. Similarly, whilst the beautiful plain of Sulmona takes advantage of the waters of the tributaries of the Pescara, lower valleys of this and the adjacent littoral regions are parched in summer.

The area of land under irrigation in the kingdom, including vegetable gardens and orchards, is estimated at two-thirds of the total area of lands that may be irrigated with economic advantage.

Indications of Agricultural Progress.— Some of the important indications of the progressive movement in Italian agriculture are the importation of fertilizers; the increasing use of chemical fertilizers, particularly in northern and central Italy, and the importation of agricultural machines and implements. The entire imports of fertilizing material which in 1901 amounted to 2,848,646 cwt. (1,421,090 cwt. of mineral phosphates, fertilizers; Thomas Gilchrist, 254,760 cwt.), at a cost of $4,712,563, rose in 1905 to 4,435,197 cwt. (2,401,440 mineral phosphates; Gilchrist fertilizer, 674,590 cwt.), at a cost of $6,504,770. The use of phosphates as land fertilizer increased from 3,000,000 cwt. in 1900 to 5,000,000 cwt. in 1905.

Agricultural Associations.— The work of agricultural associations, the combined acquisition of agricultural materials, has aided largely in introducing and spreading the employment of chemical fertilizers and agricultural machinery.

The Italian Federation of Agricultural Associations, founded in 1892, consisted in 1900 of 229 agricultural associations and the consignation of goods imported amounted to $721,359. In 1905 the federated associations numbered 468 and the value of the imports had risen to $1,877,837.

Not all the agricultural associations are members of the federation; many are branches affiliated with the agrarian associations and committees. The Committee of Purchase for the Agricultural Association of Friuli (Udine) gives the following figures: In 1905, nitrate of soda distributed 4,000 cwt.; in 1906, 7,800 cwt.; in 1907, 15,000 cwt. In 1905 they distributed 150,000 cwt. of phosphates; in 1906, 200,000; in 1907, 350,000 cwt.

The "Federazione Italiana dei Consorzi Agrarii" gave to its associates during the year 1905 agrarian machines for an amount as high as $452,000.

Agrarian Insurance Associations have grown and done well in Italy with the purpose of compensating agricultural classes for accidental damages to crops or cattle. Twenty such associations operating especially against damages by hailstones were reported in 1916 as having reimbursed damages for an amount of $5,199,749.

Agricultural Classes: Economical Reports and Hygienic Conditions.— According to the census of 10 Feb. 1901, the agricultural population was numbered 16,836,551; of whom those above 15 years of age, namely, the adult people

employed in rural works, were divided as follows:

Farmers who cultivate their own lands	2,305,795
Metayers (partners)	1,731,546
Tenants—farmers and lease holders	659,489
Stewards and rural agents	28,881
Countrymen, ploughmen, etc., at regular work	828,434
Rural laborers, at no regular work	2,423,336
Herdsmen and shepherds, etc	172,382
Gardeners and cultivators of acid fruits	77,599
Total	8,227,462

A total 413,509 higher than in the year 1881. The persons employed in agriculture between the ages of 9 and 15 years of age comprised 9,611,003 individuals.

The number of males employed in agriculture (6,411,001) is double that of females (3,200,002). To every 100 males employed in agriculture there are, in Piedmont, 77 women; in Liguria, 65; in the Marches and Abruzzi, 64; 56 in Venetia; 53 in Lombardy; 52 in the ex-duchies of Emilia, and only 5 in Sardinia; 13 in Sicily, and 31 in Apulia.

The highest percentage of male agriculturists who worked their own land or that of their family was in Piedmont, Liguria and Abruzzi; the lowest was in Romagna, Calabria, Sicily and Tuscany. Tenant farms are found in notable numbers only in Latium, Apulia and Campania. Farms abound more particularly in Venetia, Campania, Basilicata and in the Emilian ex-duchies. They are rarer in Umbria, Latium, the Marches, Tuscany, Sardinia, Romagna and Sicily. Farming on shares is customary in the Marches, in Tuscany, Umbria and Romagna, and rare in Apulia, Basilicata, Piedmont and Sardinia. The countrymen paid for regular work are found especially in Lombardy, Basilicata, in the ex-duchies of Emilia and in Sicily; those paid by the day, in Apulia, Sicily, Calabria, Sardinia and Latium.

As regards agricultural contracts, as Jacini observed, the Italian nation has shown great discernment. One can see clearly that the character of the existing contracts to-day was owing, not to chance, but to local conditions. Every form of contract would be more or less successful, according to the character of the contracting parties, and as they corresponded or not to the physical and economic conditions of the particular locality.

Hygienic Conditions — Malaria.— By reason of its conditions of soil and climate, Italy, of all countries in Europe, offers the largest field for malarial disease. Levy estimated, many years ago, the number of victims of malaria at 60,000; but since 1881 Sormani shows these figures to be exaggerated. From the Statistics on Causes of Mortality it is seen that during the period of 1887–1902 there was a maximum of 21,033 cases in 1887 and a minimum of 9,910 in 1902. The work of improvement, the preventive and curative means employed to combat the malady have contributed to lessen the rate and the intensity of the disease. The miasmatic belts were, in 1906, 3,349, distributed over the territory of 2,654 communes, of which 938 are considered totally malarial. The only provinces free from malaria are Ancona, Arezzo, Cuneo, Florence, Piacenza, Genoa, Lucca, Macerata, Parma, Pesaro, Urbino and Porto Maurizio. Malaria has been fought by the government through a series of laws, the principal one being the distribution of quinine by the government. In 1905–06 the government sold 18,712 kilogrammes of quinine; the mortality was 7,838.

Pellagra.— It has now been ascertained that pellagra is caused by a toxic poison induced by the eating of maize, and there is no pellagra where maize is not used for food. From the investigation instituted by the government in 1899 into the nature of the disease it was found that there are 40 provinces (all in upper and middle Italy) more or less severely afflicted by this endemic disease. Abruzzi, Molise, Campania, the Apulias, Bisilicata, the Calabrias, Sicily and Sardinia may be considered entirely free from the disease. The census of 1881 showed that in a population of 6,386,504 persons (which did not include all the provinces afflicted with this malady) the number of those suffering from pellagra was 104,067; while the census of 1899, made by the Interprovincial Pellagralogical Committee of Udine, gave 72,603 among a population of 7,033,440 inhabitants. In the 15 years from 1890–1904 the annual average rate of mortality from pellagra reached 3,767. By the middle of the 15 years, 1900–94, it was 2,846.

Civic Customs.—In Italy, besides the collective property ownership, which varies in origin and form, there exist private landed property and communal landed property over which the community has the rights of forestry, grazing and agriculture, etc.

Collective Property is an institution here and there in all districts, and is especially common and of great extent in the ex-pontifical states and in Emilia, where it had an approximate value of $4,800,000 in 1905, and was held, altogether, by 60,000 families (about 280,000 individuals) united in associations as communes.

The government domain of the southern provinces and Sicily is also for public use, a survival of the laws of the feudal system, which represent another typical form of collective ownership, the legal authority over which is vested in the commune, whilst the profits derived from it belong to the citizens. These domains, however, have been in part taken possession of by private individuals or by religious bodies who hold them as their patrimony. Closely related judicially to the institution of government domain is that of the *beni exademprivili* of Sardinia.

The *Tratturi* are grassy roads which extend from the mountains of Abruzzi across the slope of the sub-Apennines to the tableland of Apulia, as if the mountain pastures should extend to the Tavoliere, to the Murge, to the Salentine peninsula. These grazing lands will always exist, and will preserve their character as public property, and hence unrestricted, inalienable, always renewable. Without them the migrations of the flocks and herds would not be possible, as the summer pastures are hundreds of kilometres distant from the winter pastures. The *tratturi, tratturelli* and *bracci* are 83 in number, of varying area, the four largest of which have a total length of nearly 2,000 miles.

The number of head of cattle in the 10 provinces gathered together in these networks or roads (Aquila, Chieti, Teramo, Benevento, Campobasso, Avellino, Potenza, Bari, Lecce and Foggia) amount to about 2,720,000, of which 1,120,000 are nomadic grazers and 1,600,000 are stationary. Five hundred and twenty-eight thousand head of sheep and 30,000 cattle and

horses still make use of the *tratturi* of the government domain, to travel to the plain of Apulia, and the other 321,000 head of sheep migrate to the Roman territory.

Mortgages.— Until a few years ago it was claimed that the interest-bearing mortgages that burdened the Italian landed property exceeded $1,800,000,000. Instead of that, according to the results of the first investigation — made by the general administration of demesnes — on 31 Dec. 1903, the entire capital burdened by mortgages amounted to $608,480,558, the number of titles to 829,259 with an average value of $733. Of the 829,259 mortgages, 407,997 were on land alone; 184,232 were on manufactories, and 241,030 on lands and factories.

The 65 per cent of mortgages among private individuals did not exceed a rate of 5 per cent interest; 31 per cent of the same at 8 per cent rate of interest. Four per cent of the mortgages at 8 per cent interest were principally in the following provinces: Abruzzi and Molise, 20.5 per cent; Campania, 9 per cent; Apulia, 14.2 per cent; Basilicata, 15.2 per cent; Calabria, 15.9 per cent; Sicily, 8.5 per cent, and Sardinia, 9.6 per cent.

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30. ITALIAN INTERNATIONAL COMMERCE. As the present kingdom of Italy was only established in September 1870, we cannot go back further than 1871 in considering the progress of the Italian commercial movement. We shall therefore begin to consider the foreign commerce of Italy from 1871.

The import trade of Italy greatly exceeds her export trade, which fact depends on two principal causes: on the manner in which the customs officials appraise the merchandise; and on the fact that the enormous rush of foreign visitors to the country brings in a great quantity of money, which, makes possible an infringement of the fundamental principle of an exchange of products.

In the 35 years, lasting from 1871 to 1901, the excess of imports was not uniform, and these great fluctuations depended on general causes.

From the year 1896 to 1900 there was a period of increase of imports, which was still more marked in 1900 and 1901, when the rate of increase was maintained at 320,000,000 of lire, a little less than $64,000,000. But the entire commercial movement represents an increase from 2,900,000,000 lire ($580,000,000) to 3,745,000,000 lire ($749,000,000). The characteristic, therefore, of the present commerce of Italy, as shown by the customs house statistics, is a constant excess of imports.

Finally, there is the period of rapid rise which lasted for eight years, and which, accompanied by so many other indications of the growing commercial activity of the country, gave an assurance that this sign of prosperity was founded on a solid basis. Here are the relative figures, given in millions: (1898) 1,413; (1905) 2,078.

The periods of greater exportation are as diverse as the causes that determine them. There was a long time — 17 years — from 1871 to 1887, during which the fluctuation was barely perceptible; Italian export trade remained steady at the million mark, very gradually diminishing during the three years 1881–83, when there was a fall in exports.

In 1888 the new general tariffs and the new treaties of commerce, but above all the application of the tariff of reprisal between Italy and France brought about a period of unusual depression, which lasted 10 years before the export trade resumed its previous figures. But dating from 1898, there began a period of prosperity which is noteworthy and gives the highest figures in all the 35 years.

The division of Italian commerce into the four great groups into which we usually divide the various products, denotes the nature of her commerce. In 1905 the variations between imports and exports gave the following figures in millions of lire:

	Imports.	Exports.	Diff.
First class raw material.....	822	252	570
Partly finished material.....	428	618	190
Manufactured articles.....	473	417	46
Foodstuffs.....	363	418	46

It was 10 years ago that we found a remarkable increase in the exports of the first class, agricultural products; but the foodstuffs increased in importation as well as in exportation; so that on the whole they exceeded the trade in manufactured articles. Notwithstanding the fact that the imports of grain rose from $22,000,000 to $41,000,000, the group of foodstuffs shows an increase of $9,000,000, hence a growth of $22,600,000 of exports, as against a growth of $13,600,000 in the import trade of the same group. Briefly, an exhaustive study and analysis of statistics shows that in the course of 10 years the imports increased 1.36 per cent in proportion to the whole in first-class merchandise, and the exports have decreased at a greater rate — that is 2.46 per cent; that the merchandise of the second group was imported in an increase of 2.32 per cent of the whole, and the exports increased even more, that is, 4.62 per cent; that manufactured articles were exported in an increasing ratio of 3.83 per cent above 1896, and hardly reached 1.22 per cent in imports; that the trade in foodstuffs showed a decrease of 4.08 per cent from that of 1896, and finally decreased 5.99 per cent. Taking altogether the improvement in trade in the groups we find that while there is an absolute growth in the trade in foodstuffs, there is a noteworthy decrease in the trade of other groups. And we make the further observation that statistics of the Italian Department of Commerce show: (1) An increasing development of national industries, which demands an increasing quantity

of articles of the first class, and will enlarge the sphere of the export trade; (2) a greater degree of prosperity of the country which increases the demand for home consumption of manufactured articles and foodstuffs; (3) a transformation of the agricultural industry, which is losing ground in some of its exports and gaining ground in others. We also observe that commercial exchange with other countries is greatly facilitated at the present day; that the principle that "Products can be exchanged for products" is less applicable in the transactions between one government and other separate governments; and that we can see more readily than ever before that there is a noteworthy equilibrium of commercial exchange between one country and another. But as the commercial treaties, in modifying the ultra-protectional character of the general tariffs, aim at improving those commercial relations, which tend to equalize the value of the imports and the exports between every country, it is interesting to note this side of international commerce. In the case of those countries with which the Italian import or export is to the value of $2,000,000 or more, there is evidence of a fair equilibrium; a few are excepted, which will be specially mentioned. Great Britain, in 1904, exported an excess of $35,000,000 to Italy, but if we consider that $28,600,000 represents the hard coal which she sold to Italy, the difference is reduced to $6,400,000, a comparatively small figure. Russia exports to Italy $29,000,000 more than she imports from that country, and this is accounted for by the $27,000,000 worth of grain which she sold to Italy. The British possessions in Asia export an excess of $17,800,000 to Italy, $12,000,000 of which represents raw cotton in bulk, which Italy imports from India. The $14,200,000 of excess of importation from China comprises $13,000,000 of raw silk in bulk. The excess of $7,600,000 in imports from the United States is owing to raw cotton, of which Italy imports $29,200,000 worth.

The principal exports of Italy are to Switzerland, which buys from her over $32,000,000 worth of raw silk in bulk, and to European Turkey and Egypt where the excess of her exports is owing to cotton and silk textiles, which Italy sells to those countries. In conclusion the excess of exports from Italy to the Argentine Republic is owing to wine, olive oil, and cotton textiles, which she sells to that state.

We shall now consider the effect of the attempt that Italy is making to find fresh markets for her products. We have already seen that she has increased her exports to Egypt and Argentina to the amount of from $2,800,000 to $9,200,000 in the former, and from $11,400,000 to $25,800,000 in the latter instance, and we observe the export movement toward Belgium, European Turkey, Sweden, Norway, Greece and Malta.

This brief summary of the foreign commerce of Italy will now be completed by a few figures relating to the trade in precious metals. Although we know that the proposed customs duties are more unsettled than ever and that they do not represent commercial value or exchange we simply give the figures relating to the imports and exports of raw gold, gold and silver coin, in 10 years, 1896–1905. The table will show that Italy is slowly gaining in wealth:

	Imports (Millions of lire)	Exports (Millions of lire)
1896	10.2	19.0
1897	8.6	23.6
1898	3.4	19.8
1899	5.5	15.9
1900	7.2	16.5
1901	11.7	16.3
1902	34.7	9.9
1903	156.7	6.7
1904	44.5	9.7
1905	169.5	8.2
1916	8,390.	3,088.

In 1915 the United States imported from Italy goods valued at $54,973,726, while Italy imported from the United States goods valued at $184,819,683, or between two and three times as much as in any one of the three years immediately preceding.

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31. ITALIAN FINANCE. The public debt of Italy, its origin and development, reflects the difficulties Italy experienced in becoming a great nation. The new nation took upon itself the obligations of the various territories out of which it grew and respected all the engagements made by them.

When Italy was united in one great nation and when the province of Venice and the province of Rome were united to the Italian nation, the interest charges on the public debts of the ex-states were formed as follows (bonds bearing 5 per cent, 4 and 3 per cent interest):

CONSOLIDATED — 5 PER CENT INTEREST (IN LIRE*)	
Sardinian States	57,937,695.05
Lombardian	7,351,387.81
Venetian	7,370,551.00
Modenian	780,508.99
Parma	610,453.95
Bologna	121,500.00
Consolidated Pontifical States	1,323,725.75
Redeemable	1,982,153.18
Tuscan	1,657,054.00
Neapolitan	25,648,375.00
Sicilian	6,800,000.00
Amounting to	111,583,407.73

* Note.— An Italian "lira" is equal to nearly 20 cents.

Capital amount equal to 2,231,668,154.60

CONSOLIDATED — 4 PER CENT INTEREST	
Sardinian States	1,739,280.00
Lombardy	179,797.72
Venice	41,909.00
Naples	355,257.50
	2,316,244.22

CONSOLIDATED — 3 PER CENT	
Sardinian States	4,159,280.00
Tuscany	4,208,730.00
Modena	14,025.43
Equal to capital value of	276,607,169.19

Therefore the inherited public debts amounted nearly to the sum of 2,516,000,000

lire ($503,200,000 approximately), there remained only the obligations at 5 per cent and 3 per cent.

At this time the public debt of Italy was divided into three groups: Public Debts — administered by the general direction of public debts; Public Debts — administered by the general direction of foreign countries; and the different passivites. The essential part of these passivites is formed by those which are administered by the Director of Public Debt. When the Organic Law of 1861, No. 94, was passed, it was aimed to give a solid form to the public debt; and accordingly the public administrators ordered and formed the Big Book, in which they could inscribe the parts written in an authentic form and the guarantees and privileges of the law. A new series of public laws was formed, in order to recognize sufficiently the debts of the different states, by which the main portion of those debts were recognized. Italian obligations were inscribed in the Big Book.

In enrolling the formation of Italian public obligations we find that the forms of public duties handled by the general administration are classified in the three following categories: (1) Consolidated obligations; (2) obligations entered separately in the Big Book; (3) obligations not entered in the Big Book, or special bookkeeping accounts.

The perpetual debt especially found its origin in the debts of the former state of Modena to private persons, and from the income promised for the support of the Vatican. These passivites bear 5 and 3 per cent interest. The redeemable debts were caused by obligations of railroads assumed by the states of Tuscany and Parma and by obligations established by the Italian state to supply the expense of special railroads in Piedmont. Some parts of the redeemable obligations have been greatly reduced. The following amounts represent the duties entered separately in the Big Book:

PERPETUAL OBLIGATIONS	
For support of the Pope	3,225,000.00
Obligations and other expenses of Modena	15,384.20
Total	3,240,384.20
REDEEMABLE OBLIGATIONS	
Obligations on railroads of Tuscany and Parma	2,048,663.14
Catholic loans for the ex-states of the Pope.	1,578,450.00
Obligations 5 per cent of the ecclesiastical rules	2,929,950.00
Obligations 5 and 3 per cent for some special railway lines in Piedmont	3,847,316.00
Total	10,404,379.14

According to the above figures we have a total sum of 13,644,763.34 lire of interest derived from bonds, and bonds redeemable separately inscribed.

Duties not named and not inscribed separately handled by the general direction of the public debts, are more interesting.

Their origin was found in the laws for redeeming the precedent debts, or from the "law of new rules," relating to various works, generally for economical purposes, i.e., development of means of communication, for hygienic purposes or for the coast defenses or public utilities of the big cities. These are divided into the five following classes:

1. Obligations to redeem the railroad lines and canals, already built. Similar obligations, 3 and 5 per cent, for the Society of Roman Lines. (Lines of Livorno, Luca, Pistoia, Central Tuscany, Apiano, Grosseto and Rome) and those for redeeming the Cavour Canal.

2. Obligations regarding the new building of specified lines.

3. Obligations for completing the principal lines, and for supplying the capital necessary to increase the patrimonial property (for increasing the stations, etc.). Similar obligations of 3 per cent of the societies for renting the Mediterranean, Adriatic and Sicula lines.

4. Obligations to protect Rome from the waters of the River Tiber, and for parts of waterworks systems in Rome and Naples.

5. Various outlays, not immediately profitable.

The complete interest of the state on above obligations was on 30 June 1906, 48,372,648.60 lire on a capital of 1,416,575,607.20 ($283,315,121 approximately).

Of equal importance with the Italian Public Debt are the railroad obligations which are directly contracted by the state, or guaranteed by the state, to provide for the construction and for repairs or to complete the railroads.

A railroad debt (or bond) to the amount of 1,468,814,140.00 lire (about $293,762,828) was authorized for that purpose, but the capital actually realized was less than that amount.

These shares were issued at the following terms: 500 lire and 250 lire, redeemable in 50, 60 and 90 years. The first attempt at redemption was made in 1891 by the Minister of the Treasury, Louis Luzzatti, who instituted serious economies; especially by suspending the emission of bonds for construction of railways.

During 1894 and 1895 another and more efficient impulsion to this economy was created by the Minister of the Treasury, Sidney Sonnino, forming two new types of consolidated 4.50 and 4 per cent net.

The various attempts at a reduction of the Italian national indebtedness and particularly of the high interest charges on the same culminated in the successful conversion studied and prepared by Louis Luzzatti while Minister of the Treasury in the cabinet of Sonnino, and presented 29 June 1906 by Minister of the Treasury, A. Majorana of the Giolitti cabinet.

The conversion was in reference to the consolidated 5 per cent gross, and to the consolidated 4 per cent net. The first, of 30 June 1906, amounted to a capital of 7,903,545,040, and the other, to the sum of 196,889,800. Both capitals amounted to 8,100,434,800.

By the said law of 29 June 1906 (No. 262, the Ministry of the Treasury was authorized to abolish the 5 per cent gross, and the 4 per cent net, offering to the holders thereof 100 lire or the payment of the entire certificate at a loss of two lire, on 1 Jan. 1907, and the exchange of the old bonds of 5 per cent gross and 4 per cent net, for a new emission of securities with interest at the annual rate of 3.75 per cent payable semi-annually, to be exempt from any present or future tax from 1 July 1907 to 1 July 1912, and to pay 3.50 per cent per year, with the same exemption, from 1 July 1912.

The result was a complete success. The

payments on exchange amounted only to the sum of 4,689,700. Of this amount 3,027,800 was on the exterior, and 1,661,900 on the interior, for the capital to be converted only on the ratio of 0.056 per cent. As for the total cost of the refunding operation, including general charges, commissions, and all other expenses, it totaled only 9,637,153.62 lire, which was less than 12 centimes for every 100 lire of nominal capital to be refunded, and was only 0.87½ per cent of the amount placed at the command of the two syndicates for the purpose of meeting every possible contingency. On the other hand the profit for the national finances, because of the reduction of the interest, was very considerable. In fact from 1 July 1907 until 1 July 1912 there was a saving of 20,254,017 lire each year. From 1 July 1912 until the year 1920 a double saving will be obtained, and in the 13 years taken together the total saving to the treasury in interest charges will exceed 400,000,000 lire (nearly $80,000,000).

The public expenditures are naturally largely influenced by the receipts from taxes. These are chiefly the tax on real estate, on buildings and on rents. There is also a considerable tax on the transfer of real estate, and a tax on commerce, as well as on insurance and other commercial transactions.

Besides the contributions direct and indirect on business, real estate, rents, etc., there are the various well-known forms of taxes, i.e., the taxes of succession, taxes of registration, taxes on loans, custom house receipts, profits on sale of salt, profits of the tobacco and lottery monopolies, etc.

In accordance with this, the national receipts of the year 1905–06 were 1,945,955,181.73 lire and the expenses were 1,860,514,249.31; the difference between the two entries showing a surplus of 85,440,932.42. The budget for 1915–16 showed revenue 3,007,027,827 lire ($601,405,565 approximately) and expenditure 2,960,545,029 lire ($592,109,005 approximately).

There has been an actual surplus in recent years, a solid evidence of the prosperous conditions of the Italian finances.

Popular Discount Banks.— A study of the Italian system of banking is of importance for the reason that its financial methods enable the institutions to employ an uncommonly large portion, or proportion of the capital in order to assist commercial operations. But otherwise and in general, the Italian system of banking has no marked difference from the various systems of the European continent, especially from the French and Spanish standpoint. Let us compare it to a pyramid. The popular banks are at its base, and various institutions of less import; the societies of credit are higher, terminating with the Bank of Italy, superior to all, aided by two institutions: the Bank of Naples and the Bank of Sicily. The Societies of Stockholders maintain the popular banks, and have only a limited responsibility. Their system is one of co-operation, loaning money to members only and sharing profits among themselves.

In 1902 there were 163 banks with a capital of 255,000,000 lire.

The emission institutions, the Bank of Italy, Bank of Naples, and Bank of Sicily, the first of which is a society with a capital of 240,000,000 lire, form the main body of this system of banking; their notes in circulation being supported by or based upon the guaranty of the circulation by a metallic reserve, as provided by law. The maximum and normal limit of the circulation of the above institutions is fixed at 1,010,000,000 lire — of these 732,000,000 at the Bank of Italy, 226,000,000 at the Bank of Naples, 51,700,000 at the Bank of Sicily; the reserve being 4 per cent of the note circulation.

The emissionary institutions are subject to supervision of the government, which proceeds by ordinary and extraordinary inspections. The director of the Bank of Italy is confirmed in his charge by the government. Those of the Banks of Naples and Sicily are directly appointed by him.

To complete this brief account we may state that the circulation of bank notes payable to bearer was, in 1905, for the Bank of Italy, 929,990,560,416 lire; Bank of Naples, 29,824,979,722 lire; for the Bank of Sicily, 67,480,711.11. The metallic reserve was, on 31 Dec. 1905, for the three institutes, 1,076,418,372 lire in gold; 805,877,224 in silver; 108,208,903 on foreign security and 133,241,062 on Italian securities.

In 1916 the total debt of Italy was given as $2,610,000,000, but this certainly does not include large items added in 1915–16. And the total money circulation of the state and banks in 1916 was $1,265,926,694, an average of $34.64 per inhabitant.

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32. ITALIAN EMIGRATION. The remarkable development of Italian emigration gives an altogether general interest to this sketch. Even outside of Italy there is an ample statistical bibliography in regard to Italian emigration, but the most valuable works are those of Senator Luigi Bodio, who for many years was Director-General of the government statistics, and there are also very interesting articles concerning emigration published in the *Bulletin de l'Institut international de Statistique*, of which institute Professor Bodio was general secretary from its inception (1885) to 1906.

Worthy of record are, among others, the works of Nitti, Villari, Bosco, Tammeo, Adolfo Rossi, and in general the *Bollettino della Emigrazione*, published by the Commissioner of Emigration in the Ministry of Foreign Affairs.

Italy in the 19th century had a remarkably large emigration only after it became an independent kingdom. She had, it is true, the political exodus of 1815, 1821 and 1831; but those people did not leave any traces worthy of mention, except that among a great number of emigrants who were recruited to fight for the liberation of Italy there were scientists and geniuses of the highest rank who exalted the Italian name and made it honored in foreign lands.

EMIGRATION IN THE YEARS 1901–05.

YEARS	For Trans-Oceanic countries	For Europe and Mediterranean States	Total
1901	279,674	253,571	533,245
1902	204,654	246,855	531,509
1903	282,435	225,541	507,976
1904	252,366	218,825	471,191
1905	447,083	279,248	726,331

Altogether in the 30 years from 1876–1905, of which we have the figures given by official statistics, 8,029,353 persons emigrated; and of that number more than 4,000,000 went to trans-oceanic countries within 30 years. And these figures may be taken to be lower than the fact, owing to the inevitable inaccuracies in statistical investigations. If the calculation had been made regarding permanent emigration and temporary emigration, the latter would have shown figures somewhat larger than those given by the emigration to Europe and the Mediterranean states; and, on the other hand, somewhat smaller for permanent emigration than those given for trans-oceanic emigration. In the five years, 1901–05, the emigration, taken altogether, exceeded that of all other periods, even the 10-year periods, of the 30 years; and the figures for trans-oceanic countries are almost double those of the preceding five years, 1896–1900.

A cursory glance given to the distribution of emigrants from the various regions of Italy shows us that temporary emigration is greatest in those northern regions of Italy nearest the confines of the country; and hence emigration in those parts holds the same place that migration from one portion of the country to another held in the other regions. The permanent emigration, on the other hand, prevails in the south of Italy, and especially in Abruzzi, Basilicata and Calabria, which are, economically considered, the least progressive regions. In Liguria, which has had an industrial revival within the last few years, the emigration is very small.

Among the regions which show a great increase in emigration are: the Marches, which, in 1905, out of a population of 100,000, had 1,934 trans-oceanic emigrants; Calabria, which had 4,335 emigrants; Latium, 1,020; Abruzzi, 3,526; Sicily, 2,640, etc.

And taking the individual provinces in the various regions we find that in 1905 the trans-oceanic emigration was greater in the provinces of Caserta, Palermo, Cosenza, Catanzaro, Messina, Reggio-Calabria, Avellino, Salerno, Chieti and Potenza.

As for the emigration to Europe and the Mediterranean countries, Venetia takes the lead of all other regions with 2,965 out of each 100,000 inhabitants; Emilia follows with 1,140; Piedmont with 1,105; Umbria with 1,073; Lombardy with 1,030; the Marches with 988; and Tuscany with 800 emigrants. The smallest quota was given by Calabria, with 108 emigrants. The emigration for Europe and the Mediterranean countries (an especially temporary emigration) takes place more particularly from the northern and central provinces, as already said.

Male emigrants predominate and the adults are in excess of the children. These two characteristics are common to the emigrants from other countries. In the first three years, 1903–05, 83 out of 100 emigrants were males and 17 per cent women; and of the total number of emigrants about 11 per cent were not above 15 years old. The great predominance of males has noteworthy demographic consequences, both in the country from which they emigrate and in the country whither they are bound.

Italian Emigration to the United States, etc.— The emigration to the United States in 1905 was nearly one-half (43.62 per cent) of the entire number of emigrants. The number of emigrants for the United States increased gradually in the 30 years 1876–1905. In 1881 we find it at 11,842; 10 years later it had quadrupled (47,952 in 1890, 44,359 in 1891), falling to little more than 30,000 in 1894. But it soon increased again, and in a few years was over 100,000, and with a jump in 1901 to 1902 it rose from 121,139 to 193,772; the following year it increased again to 197,855. It was 168,789 in 1904, and almost doubled in 1905, with 316,797 emigrants. Statistics of emigration to the United States from Italy in the fiscal year ended 30 June 1915 show that only 57,217 Italians came as immigrants to the United States during that period.

But what strikes one particularly is the scanty emigration to Eritrea and other Italian possessions and protectorates in Africa, even to Tripoli; although to ensure a better future for Italian colonial politics it would be truly necessary and desirable that swarms of laborers should emigrate to those regions.

It is difficult to determine precisely the number of Italian emigrants who return to their own country, because many return by land, i.e., by rail, and one can get no reliable figures in regard to them; and the others who return by sea do not include all those who return home from trans-oceanic countries; a certain number of these disembark in foreign ports and continue their journey by rail. Out of 100 emigrants, from 36 to 40 were considered, in the last four years, as emigrants for an indefinite period and were therefore stricken off the register of the population, it being understood that they had transferred their habitual domicile to a foreign country. The great increase in emigration, whether to trans-oceanic countries, or to Europe and the Mediterranean Basin, gives rise to the necessity for investigation as to what may be the causes of this tremendous emigratory movement.

There are conditions which doubtless favor

or stimulate emigration. Thus, the near neighborhood of the boundaries of a country render it easy to leave the country, even on foot, and to betake oneself to some other state to seek for work. Even the mountainous character of various regions induces migrations in the interior of the country, from hill to plain, and in great part to the emigration to foreign countries of mountaineers who are more disposed to move about than citizens of the plains; and often they are even compelled to leave their mountain homes in the winter season in order to make a living.

But an accurate investigation into the causes should distinguish between the physical, demographical, economic, psychological, historical, administrative and tributary causes. It is impossible, here, to undertake such an investigation. Suffice it to note that malaria is a physical cause that cannot be overlooked, that the density of the population is in some cases a coefficient of some importance, together with the high birth rate and hence the increase in the number of inhabitants, owing to the excess of births over deaths. Nevertheless Calabria has a very large emigration although she has not only a low density of population (91 inhabitants to the square kilometer), but has also a low birth rate and excess of births over deaths. Liguria with a high density (204 inhabitants to the square kilometer) has a comparatively small emigration, 720 per 100,000 inhabitants, of whom 560 go to trans-oceanic countries and 160 to European and Mediterranean states. We may certainly say that, not infrequently, where the population is least dense, the emigration is even greater; for the same causes that determine the low density — as, for instance, a lack of the means of subsistence — promote also emigration.

The demographic factors, taken by themselves, cannot be held responsible for the constant increase of emigration, as there are regions with a high birth rate, and a large excess of births over deaths, and yet with a small emigration. It is the economic conditions which give a determining power to the demographical factors, and for this reason we may say that emigration in Italy is the consequence of a superabundance of population only in the sense that they have not yet found that perfection in the conditions of existence and of labor that suffices to keep them all in their own country, especially when compared with the conditions that they find in other lands.

Although Sardinia has one of the poorest regions, she has nevertheless a small emigration (341 in 100,000 inhabitants in 1905; while the average for the kingdom is 2,161). This must be attributed to the low density of population (33 to the square kilometer) and to the conditions peculiar to the island, which are not yet influenced by the social life of Italy, and to the fact that its inhabitants are passionately attached to their native soil.

In the southern provinces both poverty and the unprogressive character of agriculture, the low wages, the oppressive fiscal taxes and the antiquated and almost feudal characteristics of the relations between the proprietor of the soil and the laborer, which are specially noticeable in agricultural contracts, are the causes that help to promote emigration.

To these causes must be added those of the intellectual condition, in this sense, that wherever there is the greatest amount of illiteracy, as in the southern provinces, there may be found also the greatest amount of ignorance and belief in those who cry up the far superior conditions of labor and wages in trans-oceanic and European countries.

Having thus examined the principal causes which help to determine emigration, we have still to note the consequences which follow from them. And it is easy to understand that the increase in population, in consequence of the tide of emigration, must have a limit. In some regions one can notice either a decrease in the whole population, or a partial decrease, i.e., in a greater or lesser number of communes. The Basilicata, for instance, between 1881 and 1901 (the last two censuses) has diminished; and similarly also several districts of Calabria (Rossano, Castrovillari); of Sicily (Corleone, Termini); of Venetia (Rovigo, Massa Superiore); of Piedmont (Salluzzo, Cuneo, Pinerolo, Aosta). But it is particularly the composition of the population that shows the effect of the enormous emigration. Thus, by the predominance of males who emigrate over females, the numerical equilibrium of the two sexes is changed, so that women predominate over men in the regions from which there is the largest emigration. In southern Italy, according to Professor Bosco ('L'emigrazione del Mezzogiorno' in the *Giornale degli Economisti di Roma,* April 1906, p. 328) there are communities where the greater part of the population consists of women, children and old people, out of all proportion to the normal distribution of sex and age. And another sign that the emigration in abnormal numbers of the strongest members is beginning to have an effect on the physical constitution of the population is given in the remarkable number of conscripts who are refused on account of sickness, or physical imperfections, in several portions of southern Italy.

In regard to the economic consequences, it is certain that owing to emigration Italian labor has been better paid, that it has resulted in higher wages for those who emigrated; and the proof is in the savings sent back to the mother country in considerable sums, which, altogether, are calculated at over $40,000,000 a year. A considerable portion of these savings is employed to support the family at home; another portion is used to defray the debts incurred by the emigrant before leaving, or on the occasion of his departure; a third portion sometimes assists parents or friends to emigrate, and hence serves as a stimulus to emigration; finally, one portion of the savings is invested in house or land, or in some form of economic activity. We must not forget that emigration in reducing the supply of labor has tended to raise wages and that it has procured in other countries a numerous "clientele" for Italian producers and has procured for the mercantile marine, through its transportation of emigrants, a source of wealth which would be still greater if in this trans-oceanic movement the foreign flag was not superior in prestige to the Italian.

But as there are advantages, so there are also disadvantages arising from emigration, and among these may be mentioned, not alone the lack of labor and the consequent neglect of land cultivation (and this may be partly remedied by migrations to the country itself), not alone the

withdrawal of much of the young, active, and therefore productive, element; not alone the breaking up of families, from many of which the head is absent; but also the habit of indulgence in alcoholics, particularly among the returned emigrants. And sometimes there has also been noticed a physical degeneration among individuals: the diseases arising from bad economic conditions, it is true, have decreased; but those caused by vice in all its forms have increased. (Consult Pasquale Villari, 'L'emigrazione italiana e le sue consequenze'; in the *Nuova Antologia.* Rome 1 Jan. 1907). Delinquency has decreased in some forms, but has increased in other special forms, so that we may say that emigration, rather than diminishing crime, has changed the form of the delinquency.

The Italian government is beginning to occupy itself with the control of emigration according to the law of 1888, which we owe to Francesco Crispi, and which was intended to prevent the frauds and abuses of emigration agencies. It was more of a primitive character than anything else and it was soon found that the intervention of the government could not be restricted to these terms, but that it must exercise an efficient control, both in the country and during the voyage, and when possible in the countries whither the emigrants were bound and where they landed. Through the special efforts of the Honorable Luzzatti Pantano and Visconti Venosta, Minister of Foreign Affairs, the Parliament sanctioned a new law 31 Jan. 1901, by which the phenomenon of emigration is truly controlled by an administrative organization and with provisions which will, if amended, give better and more complete results.

This law in its essential provisions has reference to trans-oceanic emigration only, and although Art. 29 points out that the legislature has been forced to recognize the need of protecting the other emigrants from any possible deplorable occurrence, to their injury, it is nevertheless certain that the emigrants to the countries of Europe and the Mediterranean have not had the legal and social guardianship they had expected. In order to study the problems in relation to these matters two congresses have already been held; one at Udine in 1903, and one at Milan, January 1907.

Many and serious were the problems that previously confronted Italy in the first years of the present century, in regard to the phenomenon of emigration. All her material, moral and political life was at stake; and no doubt all the conditions of Italian life must improve before emigration may be restored to proportions that are not abnormal; different from those that it has assumed in the last five years of the 30 which we considered with the aid of official statistics. It may be done, on the one hand, by not permitting the country in certain regions, especially in the south, to be depopulated of its laborers; and on the other, it may be arranged that emigration shall acquire all those qualities which serve to procure for it economic power in foreign lands, a moral authority and a just appreciation of the benefits that it confers on the countries of its destination. It is interesting to notice that in 1914 emigrants from Italy to the United States numbered 167,451; and in the same year 157,000 Italians returned from the United States to their native land. During the first year of the great war in Europe — the year ending in the summer of 1915 — the number of Italians reaching the United States as immigrants was, as mentioned above (*Italian Emigration to the United States,* etc.) only about one-third as great as in the previous year, or one-fifth of the number in a record year.

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33. ITALY, DIPLOMATIC RELATIONS OF THE UNITED STATES WITH. Aside from the fantastic mission of Ralph Izzard of Tuscany during the American Revolution, the first diplomatic relations with any of the Italian nations which now form a part of unified Italy were the result of the damage to commerce of the United States from the privateers who infested the Mediterranean from 1809 to 1812 while Prince Murat was king of the two Sicilies. William Pinckney, who, in April 1816, was sent to the two Sicilies as minister plenipotentiary to obtain indemnity for losses sustained by American citizens by the seizure and confiscation of their property by the Neapolitan government, failed in his mission and was recalled. The claims long continued to be the subject of correspondence. In 1832, however, a treaty, secured by John Nelson chargé d'affairs provided for the payment of over 2,000,000 ducats (about $800,000) which was distributed by a commission. Similar claims were later made against the Kingdom of Naples and were collected in a similar manner. Relations were continued through the American chargé d'affairs at Naples until the close of 1860, and a Neapolitan chargé d'affaires at Washington from 1846 to the close of 1861. New treaties were negotiated in 1845, 1854 and 1855. Relations with Sardinia began with a treaty concerning general trade and admission of tobacco negotiated in 1838 by a special American agent. The United States continued relations through a chargé at Sardinia from 1840 to 1850 and a Sardinian chargé at Washington from 1839 to the assumption by Victor Emmanuel II of the title of King of Italy in 1861 when the Sardinian chargé became the first minister of Italy to the United States. Diplomatic relations with the states of the Church were opened in 1848 and conducted through an American chargé at Rome until May 1861 and through a minister resident from August 1861 to 1867 when the exercise of diplomatic functions was suspended and the American legation near the Pope was discontinued.

The United States sympathized with the Italian struggle for liberty and welcomed the new kingdom into the family of nations. Diplomatic relations with the consolidated kingdom, which inherited treaty obligations from the controlling or constituent states, were begun by the appointment of George P. Marsh as envoy extraordinary and minister plenipotentiary in March 1861.

Italy showed her friendship to the American Union during the Civil War. In 1864, she conceded a naval depot to the United States on certain conditions.

To meet new questions, treaties relating to consuls and extradition were negotiated in 1868 and a treaty of commerce and navigation in 1871. These were supplemented by later treaties.

In the struggle between the civil authority and the Pope, the United States refused to be involved and held no official intercourse with the Pope after the abolition of his civil power. In 1885 the Italian government objected to the appointment of A. M. Keiley of Virginia as American minister to Italy on the ground that his remarks at Richmond in 1871 in protest against the dethronement of the Pope as a civil sovereign rendered him *persona non grata*. In 1875, in response to an invitation of the United States government to European powers to join in a concerted mediation in the Spanish-Cuban War, Italy acted without result.

Italian immigration into Argentina between 1860 and 1880 laid a substantial basis for influence which attracted the attention of the United States. Italian immigration to the United States, insignificant before 1870, but gradually increasing thereafter and rising rapidly in 1889 after the crisis in South America, raised several questions affecting both domestic policy and Americo-Italian relations — including problems relating to expatriation and naturalization, new immigrant laws (to prevent the migration of criminals and paupers), the padroni system and the protection of Italian emigrants against it, and the consular inspection of emigrants at Naples.

In 1891, in connection with the Mafia incident which suddenly disturbed friendly relations and opened grave international complications, Italy raised an important question concerning the relations of the United States as a national unit with other nations in the enforcement of its treaty obligations. Several Italian members of the Mafia, or Mafiosi (an oath bound secret society indigenous to Sicily), arrested and placed on trial in New Orleans for the murder (in October 1890) of Mayor Hennessey who had been investigating the operations of the society, were lynched in March 1891, by a mob which, having become impatient with the inefficiency of the ordinary methods of administering justice in the crime-infested city, forcibly entered the jail and took the law into their own hands. The Italian government promptly sent a protest to Secretary Blaine, who expressed regret and urged Governor Nicholls of Louisiana to bring the guilty to justice. The Italian premier, probably influenced to aggressiveness by an approaching meeting of the Parliament, demanded summary punishment and indemnity. In vain did Blaine try to extricate the American government from an awkward situation by an explanation that under the American dual form of government the institution of judicial proceedings in the case belonged entirely to Louisiana, and by a rather humiliating statement that the United States had observed treaty obligation by extending to Italian citizens the same protection that it could extend to American citizens in New Orleans. His reply was regarded as an equivocation. Without waiting for the further failure of judicial proceedings in Louisiana, the Italian minister, Baron Fava, withdrew from Washington, and for a time diplomatic relations were practically suspended.

The incident, and the admission that the Federal government was without means of defending foreigners against popular violence placed America in a deplorable light before the world. The American government, after an examination of all the facts, decided that, since Congress had not made offenses against the treaty rights of domiciled foreigners cognizable in the Federal courts, it would be proper in the consideration of international questions growing out of such incidents to regard the State officers charged with police and judicial power in such cases, as Federal agents for whose acts in such cases the Federal government is answerable — as "it would be answerable if the United States had used its constitutional right to define and punish crimes against treaty rights." In 1892, the voluntary American offer of indemnity for the families of the Italian subjects who had been lynched, and the payment of over $24,000 from the diplomatic fund for this purpose, resulted in an acceptance of the reparation by Italy, the return of Baron Fava and the renewal of friendly relations which have since continued — although occasionally somewhat affected by such incidents as the closing of the Italian immigration bureau at Ellis Island in 1898 and 1899, and reflections of the American Industrial Commission upon the integrity of Italian officials. Unfortunately lynching cases similar to the New Orleans case of 1891 arose in Colorado in 1894 and in Louisiana in 1896. In each case the United States paid an indemnity.

In 1899, Italy adhered to the American open door policy in China. Three years later, she acted with Germany and Great Britain in beginning a blockade of Venezuelan ports, but soon withdrew. In the recent Italian conflict with Turkey in Tripoli, the United States had only a remote and detached interest. In the World War, relations increased in cordiality through common interests in apprehending the aggressive and offensive Central Powers which disturbed the peace from selfish motives.

Recent friendly relations have been accompanied by the negotiation of several treaties. Under the provision of the Dingley tariff act, a new commercial treaty was negotiated in 1900. A supplementary commercial agreement was made in 1909. The principle of arbitration embodied in the treaty negotiated by Secretary Root in 1908 was later extended by a new treaty negotiated by Secretary Bryan in 1914 (proclaimed in 1915) providing for investigation before declaration of hostilities. A treaty of commerce and navigation, amendatory of Article III of the treaty of 1871, and providing for right of action by aliens in cases of injury or death caused by negligence or fault, was signed and ratified at Washington in February 1913. A treaty providing for reciprocal military service for citizens of the two countries was ratified in the latter part of 1918.

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34. ITALY AND THE WORLD WAR. A general outline is given under Triple Alliance (q.v.) of the situation of Italy as a partner of Germany and Austria-Hungary from 1882 until the outbreak of the European War in 1914. The circumstances which brought Italy into that alliance are better known than those which led her to denounce the agreement and range herself on the side of the Allies as against her former partners. Since the declaration of Victor Emmanuel as king of Italy on 17 March 1861 and the annexation of Rome in 1870, Italy had become a nation and a great power. But she was the youngest of the "Great Powers" and also the smallest in population and wealth. Her position was not an easy one; she had her own ambitions for influence and empire in the Mediterranean — the traditional home of Italian expansion — and harbored pious aspirations to the heritage of Venice. But she was not quite strong enough to stand alone, and it seemed that she might always be condemned to constant waiting on the aid of other nations. The new alliance for the moment satisfied her, but it gradually changed its character, for Crispi and Bismarck brought it about that Italy was becoming not an ally but a satellite of Germany; and when Germany herself came forward as a rival for power in the Mediterranean and the East, she (Italy) began to see that the alliance compromised the very liberty of movement which she had hoped to attain. Though Crispi was not responsible for the alliance, which was formed five years before his first premiership, he was its constant defender and regarded it throughout as the corner stone of his foreign policy. The main object of the Triple Alliance, as frequently proclaimed to the world from Berlin, was to keep the peace of Europe by opposing an insuperable barrier against the designs of France on the West and of Russia on the East, to the latter of which both Bismarck and Vienna were even then quite alive. But both Berlin and Vienna had other objects in inducing Italy to join them. Bismarck was anxious at all costs to prevent an alliance between Italy and France, and Austria had her own private reasons, which she expressed from time to time in an unmistakable way. The chief of these was to stop the Irredentist agitation in Italy; for men like Kalnoky were well aware of its seriousness and naturally maintained that a claim for the return of Trent and Trieste to Italy, if successful, would be the prelude to similar claims on the part of Austria's Slavonic provinces, which would mean the break-up of the Austrian Empire. Crispi strenuously repressed this agitation at home, with a view to maintaining a good understanding with Austria, which he regarded as essential to Italy's more immediate interests in the Mediterranean, at that time seriously threatened by France. Other matters might wait; Italy would get her own in time if things went well. He believed in patience and prudence. "The virtue of prudence led us to Rome," he said in one of his great speeches in 1889, and at the same time gave it clearly to be understood what he expected and hoped would be Italy's ultimate reward for a prudent policy: "The peace of Europe is based upon treaties. We, like honest men, will respect these treaties, and, should any seek to violate them, we shall know how to do our duty." The speaker then quoted Marco Minghetti, a former brilliant member of the Assembly, "as regards the question of nationality, it is necessary to choose the most favorable opportunity, but that, should war result in alterations to the map of Europe, Italy would have little to fear, for while we have nothing to yield, we might have much to gain and receive." What Italy hoped to "gain and receive" was the region known to every Italian as "Italia Irredenta."

In 1881 France proclaimed a regency over Tunis, an act deliberately suggested by Bismarck for the purpose of sowing discord between France and Italy. The latter had considerable interests in Tunisia, which she had regarded as likely one day to be, with Tripoli, her share of the North African coast; alarmed at the occupation of the harbor of Bizerta by a great European power, Italy looked about for allies whose interests were opposed to those of France, and the Triple Alliance resulted, exactly as Bismarck desired. Italy had no objection to Germany, for Prussia had helped her in 1866 and Bismarck had nodded encouragement in 1870. Austria, on the other hand, was the hereditary jailer of thousands of "unredeemed" Italians, and the arch-enemy of the Italian race. However, Italy had to be either the ally or enemy of Austria, hence an alliance would be a protection both against France and Austria herself. As between Italy and Austria, the alliance was an unnatural arrangement, a marriage of convenience which left the Italians cold and inspired only the editorials in the official press. Hatred of Austria is a feeling deeply embedded in the bosoms of Italians, even of those Italians born in provinces which have never known the Austrian yoke. This hatred dates back to the end of 1746, when an Austrian army mercilessly sacked Genoa and was only driven out by the citizens after a five days' bloody battle. By the Treaty of Vienna in 1815 Italy was dismembered and repartitioned: Austria received the state of Lombardo-Veneto, including all of the territory between the Po, Ticino, and the Adriatic; the ancient republic of Ragusa, the valleys of Val Tellina, of Chiavenna and Bormio. The Austrian Ferdinand III of Lorraine was reinstated grand-duke of Tuscany; the archduke Francis II, cousin of the Austrian emperor, received the duchy of Modena and Reggio; Napoleon's second wife was presented with the duchies of Parma, Piacenza and Guastalla; Southern Italy, the kingdom of the Two Sicilies, was handed to a Bourbon prince and the duchy of Lucca to a Bourbon princess, etc. Revolutions against Austrian domination broke out in the kingdom of the Two Sicilies in 1820, and for the next 50 years an almost uninterrupted struggle was maintained by the Italians, suppressed with unspeakable atrocities by the Austrian soldiery (see ITALY). In the minds of Italians the name of Austria is inseparably linked with the martyrdom of countless patriots and heroes, butchered women and children, the horrors of Brescia and the dungeons of the Spielberg.

From 1815 to 1848 all Austria's maritime provinces retained their Italian character. Even the Imperial navy was predominantly Italian, being in fact known as the Imperial Royal Veneta Marina. After 1848 it was re-

organized on German lines. Even after the first revolutionary war the northeastern littoral of the Adriatic remained prevalently Italian, and Italian was the official language at Trieste as at Venice, at Cattaro as at Milan. The Slav population was primitive and ignorant; their only traces of culture were due to Italian influences. With the war of 1859 Austria lost Lombardy and, although after the creation of the Italian kingdom in 1861 she lost all authority over the western shore of the Adriatic south of the Po and ceased to be the only naval power in that sea, Austria still predominated.

In 1866 Italy missed a priceless opportunity of completing her unity and, incidentally, of settling the vexed Adriatic question once for all in her own favor. But her generals failed to follow up their initial successes; Custozza, which could have been a decisive victory, became a partial defeat, and the incompetence of Admiral Persano brought about the naval disaster at Lissa, although the Italians had all the elements of success. After the Prussian victory of Sadowa, Venice was surrendered to Italy and after the fall of Napoleon III the Papal States were incorporated in the Italian kingdom. But the heartily reciprocated hatred of Austria survived in Italy. History, as taught in Italian schools, fostered undying hatred of the Tedeschi ("Germans"), as the Austrians are popularly called; old men transmitted to their families the legacy of rancor born of bitter memories against the former oppressors of Lombardy and Venetia; and the Irredentists strove to keep the question of Trent and Trieste steadily before their compatriots. Nevertheless, for a whole generation the Triple Alliance held together like a self-denying ordinance between three mortal enemies who have decided to grip each other as tightly as they can, lest if any one of them be given elbow-room he should fly at the others' throats. The personal regard for Germany existing at one time on the Italian side developed into coolness on the growth of German "peaceful penetration" into the peninsula. German capital financed banks with Italian names; German commercial travelers commanding the Italian language flooded the country; German-owned hotels received streams of German tourists; whole sections of the Italian map became German and Austrian colonies, while German professors flooded Italian seats of learning and spread the doctrines of German Kultur. Meanwhile, German diplomacy and France's colonial expansion in northern Africa aroused Italian sentiment against France with the result that from 1888 commercial relations between France and Italy were interrupted for 11 years. Even the fall of Crispi in 1896 brought no improvement in the strained relations. With the advent to Rome in 1898 of a brilliant French Ambassador, M. Barrère, the political horizon began to clear. In 1899 commercial relations were renewed and in 1904, much to the disgust of Germany and Austria, President Loubet visited Rome, where he was enthusiastically received. Regardless of the Alliance, Austrian officialdom specially exerted itself to irritate and oppress the "unredeemed" Italians under the Dual Monarchy. It had suited Bismarck to foster Italian jealousy of French and British sea power and, notwithstanding Italy's insistent request, he refused to extend the Alliance to the Mediterranean, a fatal error of which Germany was to reap the consequences later. In joining her two partners Italy had assumed merely continental responsibilities: there was nothing in the Alliance that offered her any guarantee as to the inviolability of her coast line, which could only be threatened by France or England—or both. Italy began by arranging a complementary Mediterranean agreement with France. When England and France concluded the Entente Cordiale in 1904, the Mediterranean clauses of their arrangement were integrally bound up with the Anglo-Italian and Franco-Italian understandings with regard to the same waters. The annexation of Bosnia-Herzegovina in 1908 by Austria still further widened the breach between Vienna and Rome. In 1909 the late Tsar and the king of Italy met at Racconigi accompanied by their ministers and laid the foundations of a friendly understanding based upon their common hostility to the realization of German and Austro-Hungarian interests in the Balkans. A direct consequence of this step was the Balkan League's attack on Turkey in 1912. Italy had shaken off her leading strings and ceased to be the Cinderella of the Triple Alliance; those strings were snapped when Italy made war on Turkey in 1911 and seized Tripoli. During the Tripolitan War the Austrian newspapers loaded Italy with abuse and Vienna placed every obstacle in her path, forbidding her to attack the Dardanelles, Preveza, San Giovanni di Medua, Salonica and Kavalla, and to seize the then Turkish islands of Chios and Mytelene. Thus the Italian and the Balkan League victories over the Turk caused deep disappointment to both Germany and Austria. Germany had undoubtedly reaped the least benefit from the Alliance during the 10 years preceding the European War. The Kaiser had done his best to keep his two partners together and in the position of subordinates, but both had kicked over the traces—Aehrenthal in 1908 and Giolitti in 1911. Irredentist sentiment in Italy grew stronger and threatened to burst into flames. To prevent an immediate rupture between her two allies Germany urged the instant renewal of the Alliance long before the fixed date on any possible terms whatever. German inspired newspapers hinted in 1912 that Italy would act wisely in confiding the direction of her Mediterranean interests to the Triple Alliance, advice which Italy naturally ignored; it was too late. In the hands of the late Marquis di San Giuliano the foreign policy of Italy was played to the advantage of Austria. Despite the warnings of non-official Italians and British friends of Italy the Marquis opposed Serbian aspirations to an Adriatic port and supported Austria in setting up a fictitious Albanian kingdom. By her course of action, Italy antagonized all the Balkan allies including Greece and upheld the interests of Austria. Already in 1913 Austria had sounded Italy with a proposed attack on Serbia, which plan was instantly rejected; the assassination of the archduke and his wife in the following year gave Austria her opportunity. This time Italy was not consulted. It did not leak out till 14 months later that the German Ambassador in Constantinople had informed his Italian colleague there on 15 July 1914 (eight days before the presentation of the Austrian ultima-

tum at Belgrade) that the Austrian note would be so worded as to render war inevitable. For some unexplained reason the Italian Ambassador (Signor Garroni) kept this piece of information for a year before communicating it to his government.

Whether with or without the connivance of Germany, Austria meant to make war on Serbia. Italy proclaimed with no uncertain voice that this was an act of aggression and that the purely defensive stipulations of her alliance relieved her of any obligation to stand on the side of Austria. That Italy should not enter as an ally of the Central powers into a war as to the origin of which she was not consulted, and in which the successes of her allies would have been fatal to her own ambition, was obvious. She stood aloof, mistress of her own actions; and then came the great temptation — the offer to Italy of the Trentino by Austria as a gift in return for neutrality. But the Italian people saw that to accept the gift would be to mortgage the whole future of Italy; to Austria it would have been blackmail extorted in the hour of danger; to Germany, who could lose nothing by the transaction, it would have been a gift thrown to a poor relation. But there were other elements at work besides the considerations of mere material interests. Italy stood divided between three opinions: there were those who favored the Triple Alliance and believed in a German victory; there were the "neutralists"; and the Irredentists, who demanded war against Austria. The entry of Great Britain gave the Triplicists pause; there was the British navy and a great, exposed Italian coast-line; neutrality presented a different but equally unpleasant problem: a German victory would make Italy a German satellite for all time, while on the other hand an Allied victory, with Italy indifferently standing aside, would only leave her out in the cold if ever "alterations to the map of Europe" should take place. Furthermore, the Irredentist policy of active participation on the side of the Entente was impracticable at the time; Italy was unprepared and had not recovered from the burden of the Turkish War. An immediate declaration of war against Germany was difficult for many reasons, of which not the least was the appearance of bad faith. Thus Italy declared her neutrality, though it was no secret to which side her political and sentimental inclinations leaned. In 1902 Italy had assured France that her alliance with Austria and Germany was not directed against the Republic; in the terms of her alliance Italy had stipulated that she should never be called to fight against England; in the summer of 1914, even before the European crisis assumed dangerous proportions, Italy had whispered a friendly warning to England to be on her guard; and in the dark days preceding the first battle of the Marne, a generous assurance from Italy enabled France to remove some 500,000 troops from the Italian frontier and throw them across the path of the invader. The two last-mentioned services rendered by Italy to the Allied cause should not be forgotten; they were of incalculable value to the Entente. However, the immediate occasion for hostile action against Austria and Germany was still wanting. Signor Salandra had been Premier since March 1914; in opposition stood Signor Giolitti, four times Premier and the most powerful political influence in Italy. He desired certain gains for his country, but preferred bargaining to war and urged acceptance of the Austrian offers. The majority in the Italian Parliament was neutralist; the aristocracy largely pro-German. It was among the masses of the people, however, that different counsels prevailed. So early as 26 July 1914 M. Barrère wired to his government, "I observe that the greater part of Italian public opinion is hostile to Austria in this serious business." It was not long before German and Austrian methods of warfare aroused intense indignation in Italy. Many Italians joined the French and British armies; thousands of Italians who were Austrian subjects by birth flocked over the borders into Italy and offered themselves to fight against Austria. Added to mingled enthusiasm and indignation, the concrete grievance of an Italian "Alsace-Lorraine" existing in the shape of Italia Irredenta could only intensify the martial spirit that spread over Italy during the nine months of neutrality. Popular sentiment, free from the responsibility of statesmanship, was not neutral.

The full records of the early diplomatic negotiations between Austria and Italy have not been made public. The Austrian 'Red Book' and the Italian 'Green Book' published, for the first time, the text of articles III, IV and VII of the Triple Alliance, hitherto kept secret. Though containing an invaluable revelation of long standing friction between the two states, the books cover only one month of diplomatic history, from 25 July to 25 Aug. 1914. From an official statement issued in Washington by the Italian Ambassador on 25 May 1915, we learn that early in July 1914 the Italian government, "preoccupied by the prevailing feeling in Vienna, caused to be laid before the Austro-Hungarian government a number of suggestions advising moderation, and warning it of the impending danger of a European outbreak. The course adopted by Austria-Hungary against Serbia constituted, moreover, a direct encroachment upon the general interests of Italy, both political and economical, in the Balkan Peninsula. Austria-Hungary could not for a moment imagine that Italy could remain indifferent while Serbian independence was being trodden upon. . . . Therefore when Austria-Hungary [after repeated warnings from Italy] ignored the usual practices and menaced Serbia by sending her an ultimatum without in any way notifying the Italian government of what she proposed to do . . . she not only severed her alliance with Italy but committed an act inimical to Italy's interests." The statement declares that "Conversations were initiated immediately after July 23 [the date of the Austrian ultimatum to Serbia] for the purpose of giving a new lease of life to the treaty which Italy alleged had been *violated* and thereby *annulled* by the act of Austria-Hungary. This object could be attained only by the conclusion of new agreements. The conversations were renewed, with additional propositions as the basis, in December 1914." The final correspondence published in the 'Red Book' leaves the impression of an approaching agreement between San Giuliano and Count Berchtold. On 16 October 1914 San

Giuliano died and was succeeded in the Foreign Office by Baron Sonnino. A long and intricate diplomatic duel now began between Italy and Austria, Germany intervening. Early in December 1914 Baron Sonnino took his stand upon the terms of the Triple Alliance, especially Article VII, according to which Italy and Austria-Hungary were pledged to "give reciprocally all information calculated to enlighten each other concerning their own intentions and those of other powers," and that if either of the two parties "should be obliged to change the *status quo*" in the Balkans or of the Ottoman coasts and islands in the Adriatic or the Ægean seas, such change "would only take place after previous arrangement between the two powers, which would have to be based upon the principle of a reciprocal compensation for all territorial or other advantages that either of them might acquire" as a result of such change. By this clause Austria was bound not to occupy any Balkan territory without a previous agreement with Italy nor without adequately compensating her. Austria having invaded Serbia and thereby disturbed the whole political gravity of the Balkans, compensation was due to Italy. In reply to Count Berchtold's contention that Italy could have no grievance, because the Austrian occupation of Serbia was only "momentary," Baron Sonnino reminded him that in April 1912 Austria had protested against the Italian bombardment of the Dardanelles and had prohibited even the use of searchlights against the Turkish coast, on the ground that such acts were an infringement of Article VII. Furthermore, Austria had also threatened that "if the Italian government desired to regain its liberty of action the Austro-Hungarian government would do the same." At this point the diplomatic honors lay with Baron Sonnino, who maintained that Italy was entitled to apply the same regulations to Austria at war as that country had applied to Italy when at war. On 20 Dec. 1914 Count Berchtold accepted the principle of Baron Sonnino's stipulations. Prince Bülow, former German Chancellor, was sent to Rome to keep Italy neutral by vicarious offers at the expense of Austria. The Austrian diplomats were playing for time, but Baron Sonnino pinned them down to the question, "What compensation are you prepared to offer for a breach of the Triple Alliance, which you are compelled to admit?" The appointment of Baron Burian (q.v.) as Austro-Hungarian Foreign Minister in place of Count Berchtold introduced a counteracting factor. Baron Burian was willing to offer compensations from other people's territory and suggested that Italy should look for her compensation after the war in Albania. The suggestion was rejected by Italy. Germany pressed Austria to surrender the Trentino and Prince Bülow urged Italy not to demand Trieste. Italy was meanwhile putting her army on a war basis and laying up military stores. Rome became the centre of political gravity for all the principal belligerents, outbidding each other for the support of Italy. On 12 Feb. 1915 Baron Sonnino withdrew his original proposals for the cession to Italy of at least the unredeemed territories of the Trentino and the port of Trieste, and addressed a warning to Austria that any new military action undertaken in the Balkans against either Serbia or Montenegro, without previous agreement with Italy, would be considered an infringement of Article VII of the Alliance and would lead to grave consequences. The result of this step was to secure a temporary immunity from attack for Serbia at a time when there were credible rumors of a fresh invasion with German assistance. Negotiations began afresh in March 1915 with an offer by Baron Burian, now converted, by German pressure, to the principle that compensation must be made from Austrian territory. Baron Sonnino insisted on immediate negotiations without German intervention. Burian's offer of "territories in South Tyrol, including the city of Trent," coupled with suggestions for a counter-payment by Italy, was rejected as too vague and meagre. On 20 March Prince Bülow informed Baron Sonnino that Germany would guarantee the execution of any agreement arrived at between Vienna and Rome. As Italy had insisted that the transference of any territories agreed upon must be made at once, the German offer of guarantees touched the heart of the controversy and led Baron Sonnino to ask what use the guarantee would be in case the Central Powers were defeated. On 8 April the Italian demands were definitely formulated, demanding the cession of the Trentino with the setting up of the boundaries fixed for the kingdom of Italy in 1811, and a new eastern frontier, to include Gradisca and Gorizia; the formation of Trieste and its neighborhood into an autonomous state completely independent of Austria; the cession of the Curzolari Islands off the coast of Dalmatia; the immediate evacuation by Austria-Hungary of Trieste; the recognition of Italian sovereignty over Vallona and district, and the renunciation by Austria-Hungary of any claims in Albania. In return for these concessions, Italy would pay 200,000,000 lire ($40,000,000) as indemnification for loss of government property, would pledge herself to maintain neutrality throughout the war toward both Austria and Germany, and would renounce, for the duration of the war, any further claim under Article VII of the Triple Alliance. These proposals were declined by Vienna on 16 April 1915.

During the progress of these complicated negotiations the statesmen and diplomats of the Allied powers had not been idle in courting Italy. Of all the then neutral powers the action of Italy was most vital to the struggle, for she occupied a strategic position on the flank of both combatants. Her intervention on behalf of Germany and Austria would menace the French right-wing; and if she joined the Allies she would menace the Austrian left, while her fleet would establish a crushing superiority against Austria in the Mediterranean. From the Italian point of view, the decision was necessarily dictated by the interests of Italy, and those interests were becoming clearly defined. When the war broke out Italy's interests were, on the whole, opposed to those of Germany and Austria; her relations with France and Great Britain were cordial and the sympathies of her people lay overwhelmingly with the Entente Allies. As already pointed out, uncompromising neutrality might leave Italy, at the end of the war, whichever side gained the victory, as the friend of neither the conquerors nor the vanquished, and with the realization of her national ambitions indefinitely

postponed. It was not improbable that the predominant factor which guided the final decision of Italy was the question of whether she would be able to hold such territories (if ceded by Austria) in the event of a German victory. Perhaps the terms laid down were so framed as to invite rejection, following a precedent set by Austria in the Serbian ultimatum. Ten days after their rejection by Baron Burian a secret agreement was concluded in London on 26 April 1915 between Italy, France, Great Britain and Russia. The terms of that treaty were first published to the world on 28 Nov. 1917 in Petrograd, by order of Leon Trotzky, the Bolshevist Foreign Minister of Russia. (See LONDON, TREATY OF, 1915). On 3 May 1915 Baron Sonnino sent to Vienna a formal denunciation of the Italo-Austrian Alliance. Public opinion in Italy had meanwhile become loudly clamorous for intervention. The fate of Belgium and Serbia had created a deep impression and the news of the sinking of the *Lusitania* raised popular feeling to fever-point. Gabriele D'Annunzio (q.v.) and the grandsons of Garibaldi appealed to vast, enthusiastic audiences. The Central Powers made one more attempt to save the situation. Baron Burian hastily offered further concessions as the basis for a new treaty. A political crisis then broke out. The neutralist ex-premier, Giolitti, who had fled from Rome a few months before, now reappeared. His followers agitated for acceptance of the Austro-German terms. It seemed possible that he might return to power with an anti-war policy. Signor Salandra's resignation on 13 May, a week before the meeting of Parliament, suddenly brought matters to a crisis and revealed the temper of the country. On the 16th it was announced amid great popular rejoicing, that the king had refused to accept the resignation of Salandra. Giolitti left Rome without facing Parliament and on the 20th the government secured overwhelming majorities in both chambers giving it extraordinary powers in the event of war. The Austrian execution of Cesare Battisti (q.v.) sent a thrill of horror through the country; the fiery eloquence of D'Annunzio, supplied the last spark for the conflagration. He gave voice to the indignant revolt against impotence and dependence when he exclaimed: "We will no longer be a museum of antiquities, a kind of hostelry, a pleasure-resort under a sky painted over with Prussian blue for the benefit of international honeymooners!" The Italian people called for war, not so much against the traditional foe of Italy as against the power which threatened the civilization of the world. On 22 May a general mobilization was ordered and on the 23d Italy entered the war by a formal declaration of hostilities against Austria. Baron Sonnino's skilful diplomacy had put Italy technically in the right; she went to war on grounds fully justified by the public sentiment of Europe. So far from "coming in on the winning side," Italy joined the Allies at a moment when their prospects looked black. Mackensen's phalanx was driving the Russians in Galicia and the British had suffered severely at Ypres. The first Dardanelles campaign had failed. In the spirit of Garibaldi and his Thousand, Italy entered upon her latest war of liberation with a popular enthusiasm which had very little care for material rewards.'

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ITALY, Free Church in, or the Evangelical Italian Church, a reformed religious sect founded by Alessandro Gavazzi in 1870 (see GAVAZZI, ALESSANDRO). In 1874 a confession of faith was formulated, an ecclesiastical constitution framed under a General Assembly and the title of "Free Church in Italy" assumed. The confession is practically that of the Protestant churches, and the constitution is based on the government by elders, like that of the Presbyterians, though the several congregations are practically uncentralized, as with the Independents. In 1891, by royal decree, the title "Chiesca Evangelica Italiana" was given to this body. Elementary and Sunday schools are maintained. The schools of the church in Florence are partially supported by the state, and a gift bought and presented by British friends is the old

church of San Jacopio in Florence. According to recent statistics the General Assembly legislates for 40 congregations represented in 10 districts embracing over 2,000 communicants.

ITASCA LAKE, farthest source of the Mississippi, in northern Minnesota. It is located about 47° 13′ 10″ N. and 95° 12′ W. at an altitude of 1,457 feet above sea-level. It was first definitely proved to be the source of the Mississippi by H. R. Schoolcraft (q.v.) in 1832 as a result of a journey of exploration undertaken under the auspices of the United States government. At the same time it received its name by a fanciful combination of the two Latin words *ver-itas-ca-put.* Claims have been made at times, especially by W. Glazier, that another lake beyond Itasca Lake, known as Elk or Glazier Lake, is the ultimate source of the Mississippi. These have not been substantiated, however, and Itasca Lake is still considered officially the source of the father of rivers. The ground has a substratum of sand and gravel, mingled with large boulders; the surface is spongy and swampy. This basin has been made a national park of about seven by five miles, containing 19,701.69 acres (30.78 square miles). In the centre, fed by sources so permanent and with a flood plain so small that it has actually risen in dry seasons (though it receded some feet during the 19th century), lies Itasca, a giant among the small ponds around it, but having an area of only 1,130 acres, or 1¾ square miles. It is composed of a centre running east and west about a mile, whence extend south an east and a west arm about 1½ miles long each, and another northward about a mile, the width varying from one-sixth to three-fourths of a mile. It has a shore line of 23,000 yards (over 13 miles). Depth, 4 to 50 and 60 feet; average, 20 to 35. The Mississippi flows from its north arm; a strong brook called by Nicollet the "Infant Mississippi" flows into the west arm. The basin of Itasca Lake has been made into a state park. (See MISSISSIPPI RIVER). Consult Brower, J. V., 'Itasca State Park' (Saint Paul 1904); Brower, J. V., 'The Mississippi River and its Source' (in *Minnesota Historical Society Collections,* Vol. VII, Saint Paul 1894); Baker, J. H., 'The Sources of the Mississippi' (in ibid., Vol. VI, p. 1, Saint Paul 1894); Baker, L. H., 'Origin of the Name of Itasca Lake' (in *Magazine of Western History,* Vol. IV, p. 336, Cleveland 1886); Chambers, J., 'The Mississippi River' (New York 1910); Clarke, H., 'The Source of the Mississippi' (New York 1886); Glazier, W., 'Down the Great River' (Philadelphia 1888); id., 'Headwaters of the Mississippi' (Chicago 1897); Schoolcraft, H. R., 'Narrative of an Expedition through the Upper Mississippi to Itasca Lake, etc.' (New York 1834); id., 'Summary Narrative of an Exploratory Expedition to the Sources of the Mississippi River in 1820, etc.' (Philadelphia 1855); Winchell, N. H., 'The Source of the Mississippi' (in *Minnesota Historical Society Collections,* Vol. VIII, p. 226, Saint Paul 1898).

ITATA CASE, 1891, the cause of differences between Chile and the United States, resulting from the *coup d'état* of Balmaceda (q.v.) and the revolt of the constitutional party in Chile. The latter through an agent had bought a quantity of arms and ammunition in New York, which were shipped to San Francisco and then sent by a schooner to the southern coast, where it was met by the insurgent's vessel, the Itata, and the cargo transferred. The vessel had a few soldiers and a little artillery on board. The attorney-general issued a writ of detention on the ground that she was violating the United States neutrality laws; the Itata, however, escaped, the United States cruiser Charleston was sent in pursuit, overhauled and captured her, and placed her on trial before the United States district court at San Diego. The courts discharged her as not having been guilty of such violation. Consult Godkin, E. L., 'Itata Case' (in *Nation,* Vol. LII, p. 416, New York 1891); United States, President, Benjamin Harrison, 'Message of the President Respecting the Relations with Chile' (Washington 1892).

ITCH, a contagious disease of the skin (scabies) due to its invasion by the itch-mite (*Sarcoptes scabiei*), now rather rare in civilization. Even the adult mite is so small as to be barely visible, the female being about one sixteenth of an inch long and not quite as wide, while the male is still smaller. It has eight legs, two on each side of the head, to which suckers are attached, and four behind. (See ITCH MITE). The female burrows into the skin and deposits her eggs, about 50 in number, and dies after a period of six weeks. After the eggs hatch out, the young make their way to the surface, and the impregnated females again burrow into the skin, so keeping up the process. The most frequent sites selected by the bugs for their burrows are the web between the fingers, the front of the wrists, the umbilicus, the genitals in men, and the under side of the breasts in women. The first sign of the disease is itching, which forces the patient to scratch, particularly at night, as the warmth of the bed increases the itch. The skin soon becomes inflamed from scratching, and the discomfort is increased. Close examination may show the tiny burrow like a reddened pin-scratch about half an inch long. Many remedies are used with success but sulphur in the form of an ointment is the most common. As the bugs cannot be killed while still in the skin, a good plan is to take a hot bath with brisk rubbing, apply the ointment night and morning for three days, continuing to wear the same clothing and sleep in the same bed-clothes; at the end of that time another bath is to be taken, all clothing and bed-clothes changed, and another series of rubbings started. This must be continued as long as fresh burrows are found.

ITCH MITE (*Acarus scabiei* or *Sarcoptes scabiei*), a minute icarus, supposed by some naturalists to be referred to by Aristotle in his 'Historia Animalium.' From the 12th century onward the connection of the mite and the itch was recognized but from 1800 to 1834 grave doubts were expressed. In that year, Renucci, a Corsican student, demonstrated the presence of the mite and investigation has since thrown much light on its structure and habits. The female is longer than the male, being visible to the naked eye, about one-fifth of an inch in length. In order to penetrate the horny layer of the epidermis, the mite assumes a nearly perpendicular position; and to avoid as much

trouble as possible, it usually selects such spots as give least resistance, such as the space between the fingers, the inside of the wrist, etc. Once fairly buried, it does not again come out, but burrows, and forms tortuous galleries within the skin. These galleries resemble the mark which is formed when a pen is drawn lightly over the skin without causing a scratch. In young children, and in persons with a delicate skin, they appear of grayish white color; while in persons with a coarse, dirty skin they are blackish. At certain intervals the galleries are pierced by small openings, for the admission of air. It is through these openings, which sometimes appear like very minute black dots, that the young escape. The vesicles characteristic of the itch disease are attributed to a poison ejected by the mite. There are fewer males than females. (See ITCH). Consult Osborn, 'Insects Affecting Domestic Animals' (Washington 1896) and Raillet, 'Zoölogie medicale' (Paris 1895).

ITHACA, N. Y., city and county-seat of Tompkins County, on Cayuga Lake (42 miles long), and on the Lackawanna, Lehigh Valley and Central New York Southern railroads. It derives water power from several streams and has manufactories of autophones, silent roller chains, flour, advertising signs, cement, furniture, calendar clocks, firearms, salt, salt bags, well-drilling machinery and tools, furniture, paper, cigars, carriages, boats, iron castings, traction engines, portable houses, incubators, brick, heel plates, rowing shells, aeroplanes, shirts, moving picture films, etc. The city is best known as the seat of Cornell University (q.v.) and the New York State Colleges of Agriculture and Veterinary Surgery (combined annual registration over 7,000), and the Cascadilla Preparatory School; and also as a popular summer resort. There are two national banks, one trust company and two savings banks (bank resources, $10,000,000), trolley connection with East Ithaca, large farming trade with Tompkins, Tioga, Cortland and Seneca counties; and an assessed property valuation exceeding $8,000,000. Excellent State highways radiate in all directions. In the immediate vicinity are numerous gorges and waterfalls, the most noted of the falls being Triphammer, Ithaca, Enfield, Taughannock and Buttermilk. The Taughannock is 215 feet in height and is the highest waterfall east of the Rocky Mountains. There is here the Cornell Free Library containing 21,000 volumes, the Ithaca Conservatory of Music and Renwick Park. Under the charter of 1888, the government is vested in a mayor and city council elected every two years. An active Board of Commerce extends co-operation to manufacturing concerns and the rural community. Ithaca was first settled in 1787 and was called at different periods, "Sodom," "The Flats" and "the city," until 1806, when Simeon Dewitt gave it the name it bears. It was incorporated as a village in 1821. Pop. 16,759.

ITHACA, the modern **ITHAKI**, one of the Ionian Islands, and the smallest except Paro, 17 miles northwest of the mainland of Greece and two miles north of Cephalonia. The surface is mountainous, but there are many pleasant valleys. The area is about 40 square miles. It was celebrated among the ancients as the principality and home of Ulysses. Vathi is the capital. Pop. 12,000.

ITHAKI. See ITHACA.

ITINERANCY, a passing from place to place; in ecclesiastical usage, the Methodist system of limited pastorates instituted by Wesley. In the American Methodist Episcopal Church, North, no time limit has been placed on pastorates since 1900, although the bishop appoints preachers from year to year. See METHODIST CHURCHES OF THE WORLD.

ITINERARY, or **ITINERARIUM**, the schedule of a route or table of the stages between two places of importance with the distances from one to another. Much of our knowledge of ancient geography is due to the intineraries issued by ancient peoples. Of these the best known are 'Itineraria Antonini' and 'Itinerarium Hierosolymitanum.' The former contains the 'Itinerarium Provinciarum' and the 'Itinerarium marinum.' Various editions have been published, the best is perhaps that edited by 'D'Urban Recueil des itinéraires anciens' (Paris 1845).

ITIUS PORTUS, the port on the French coast, nearly opposite Dover, from which Caesar sailed on his second expedition to Britain in 54 B.C. Its position has been a matter of much controversy; the majority of geographers, however, identify it with Wissant, a village near Boulogne.

ITO, Hirobumi, PRINCE, Japanese statesman: b. Choshu, 2 Sept. 1840; d. 26 Oct. 1909. His father was a samurai retainer of the daimio of Choshu, with whom the youth became a trusted agent in his opposition to the Shogunate. While at Yedo in the interests of his chief, Ito became acquainted with western methods of warfare, consequent on the visit of Commodore Perry in 1854, and determining to study these in their native countries, with four comrades, including Inouye, left Japan secretly, and eventually arived in London. Diplomatic complications arising, owing to his daimio ignoring the right conferred by the Shogun on European powers to navigate the Inland Sea. Ito hastened home before two years had elapsed, but was unsuccessful in his efforts to persuade the daimio of Choshu from opposing the European fleets assembled at Shimonoseki. The daimio defeated, Japan awakened to the power of the West, and Ito became the impelling factor in its reorganization on models more in accord with the leading powers of the world. He took an active part in the overthrow of the Shogunate and the restoration of the Imperial power in the person of the Kotei or Mikado; in 1868 was appointed governor of Hiogo, and in 1869 vice-minister of finance. He then became prominent as an advocate of uniform coinage. In this connection he visited the United States and after studying the financial system of that country returned to Japan with the recommendation that the decimal system of money be adopted, which was done, and a mint established at Osaka. In 1872–73 he made a tour of the world, as a member of Iwakura's embassy, for the purpose of revising or modifying the treaties then in force. In 1872 he became minister of public works and established a college of engineering and secured the building of the railway from Yokohama to Tokio. In 1876 he

MARQUIS HIROBUMI ITO

again visited Europe to study the constitutions of the various countries for the purpose of remodelling that of Japan. On his return he inaugurated a radical plan for changing social customs. Having become minister-president of state he started these reforms in the government offices, eliminating men of the old schools and substituting men of modern training and thought. He also reconstructed the laws and codes according to the ideas of western countries and carried out many reforms in economy. In 1882, the emperor, desirous of adopting the constitutional form of government, commissioned Ito to proceed to Europe and America in order to investigate the governmental systems of the two continents. While in Europe he attended the coronation ceremony of Tsar Alexander III, as a representative of Japan, and returning in the following year, he began the work of drafting the constitution of the Empire. One year later Ito was appointed minister of the imperial household and created count. In 1885 he was dispatched to China and concluded the Tientsin Treaty with the late Li Hung-Chang; became prime minister in the same year, but in 1888, when the privy council was created, resigned the premiership and was made president of the council. The constitution, the result of his exhaustive investigation, was proclaimed on 11 Feb. 1889, and when the imperial diet was first convened, Count Ito was appointed president of the house of peers. During his second premiership war broke out with China, and it was he who negotiated peace and concluded the Shimonoseki Treaty. In recognition of his services during this war Count Ito was created Marquis in 1896. In the same year he resigned the premiership only to form his third cabinet in 1898. Soon afterwards, however, at his own request the emperor relieved him from office, and he recommended to the sovereign the leaders of the two political parties then becoming prominent in the political life of the country. His advice was acted upon and these leaders formed a party cabinet, but soon quarreled, and the first party cabinet in the history of Japan ended in failure. Ito then organized a political party, the Constitutionalists, but this action evoked strong opposition from the conservative element. When he formed his fourth cabinet in 1900, Marquis Ito met with firm opposition from the house of peers the members of which were mostly conservative in view. His premiership was short-lived; he resigned in June 1901 and in order to improve his health visited Europe and America. He received the degree of LL.D. from Yale University and in England was created grand commander of the most Honorable Order of the Bath. Subsequently he severed connection with the party of his own creation and was appointed president of the Privy Council. He failed to reach an understanding with Russia and at once opened negotiations which resulted in the Anglo-Japanese alliance of 1902. During the war with Russia, Marquis Ito, as one of the "Elder Statesmen" was the most trusted counsellor of the emperor. After the conclusion of peace which he did much to bring about, he was twice dispatched to Korea, these visits resulting in the Japan-Korea Treaty, declaring the Japanese protectorate over the peninsula. The marquis was ultimately appointed Resident-General of Korea, which high office he continued to hold until his assassination by a Korean at Harbin. The marquis was raised to the rank of prince in 1907. (See JAPAN; KOREA). Consult Fitzgerald, W. G., 'Some Japanese Statesmen of To-day' (in *Putnam's Magazine*, Vol. III, New York 1908); Foster, J. W., 'Marquis Ito, the Japanese Statesman' (in *International Quarterly*, Vol. IX, New York 1904); Ladd, G. T., 'In Korea with Marquis Ito' (ib. 1908); and Nakamura, K., 'Prince Ito, the Man and Statesman' (ib. 1910); Griffis, W. E., 'The Statesmanship of Ito' (in *North American Review*, Vol. CXCI, New York 1910); Johnston, J. T. M., 'Hirobumi Ito — Japan' (in 'World Patriots,' ib. 1917); Palmer, F., 'Marquis Ito, the Great Man of Japan' (in *Scribner's Magazine*, Vol. XXX, p. 613, New York 1901).

ITRI, Italy, town of the province of Caserta, 90 miles southeast of Rome. It contains many ancient remains including an old tower supposed to be the tomb of Cicero, who was assassinated near Itri. The old castle and many of the houses were erected from stone taken from the Via Appia. Consult Baedeker 'Southern Italy and Sicily' (Leipzig 1912). Pop. 6,100.

ITURBIDE, ē-toor-bē'dā, **Agustín de**, emperor of Mexico: b. Valladolid de Michoacan (now Morelia), Mexico, 27 Sept. 1783; d. Padilla, State of Tamaulipas, 19 July 1824. In 1810 he was lieutenant in the provincial regiment of his native city, but on the breaking out of the troubles in Mexico joined the royalist party, and in this cause displayed such valor and ability that in 1816 he rose to the command of what was called the northern army, which occupied the provinces of Guanapuato and Valladolid. In 1820 the imprudent acts of the Spanish cortes produced so much exasperation among the clergy and the partisans of absolutism in Mexico, that these persons united to effect the independence of their country, selecting Iturbide as their agent, and appointing him commander of the army in the south. He quickly bore down all opposition, and became so popular that he was proclaimed Emperor of Mexico, in May 1822, under the name of Agustín I. The Congress declared the throne hereditary in his family, and voted him a yearly allowance of $1,500,000. His troubled reign during which he showed great arrogance, disregard of all constitutional restraints, and cruelty towards his opponents came to an end in less than a year, by his abdication in March 1823. Congress granted him on his abdication a yearly pension of $25,000 on condition of his leaving the country, making sufficient provision for his family in case of his death. He resided in Leghorn for about a year, when he was induced to make an attempt to recover his lost crown. He first went to London where he published his famous *Statement* (transl. into English in 1824) and sailed for Mexico 11 May 1824. He landed with but a single attendant at Soto la Marina on 14 July 1824, but immediately was arrested and five days later was shot by order of the state of Tamaulipas without even being given a chance to appeal to Congress. His remains were, in 1838, brought to Mexico City and repose in its cathedral. At the same time he was officially invested with the title "Liberator." His family settled in Georgetown

and later in Philadelphia, where his widow died in comparative poverty in 1861. Several of his sons subsequently held positions under the Mexican government, the eldest, Prince Angel, dying in the City of Mexico in 1872, the youngest, Prince Agustín, dying in Paris in 1873. Prince Angel's son, Agustín, b. 1864, was adopted by the Emperor Maximilian (q.v.) as his heir, Maximilian himself being childless. The collapse of the second empire, however, destroyed his chances of a throne. (See MEXICO). Consult Beneski, C. de, 'A Narrative of the Last Moments of the Life of Don A. de Iturbide' (New York 1825); Bigelow, J., 'The Heir-Presumptive to the Imperial Crown of Mexico' (in *Harper's Monthly Magazine,* Vol. LXVI, p. 735, New York 1883); Bulnes, F., 'La Guerra de Independencia, Hidalgo-Iturbide' (Mexico 1910); Bustamante, C. M., 'Historia del Emperador Agustín de Iturbide' (Mexico 1846); Iturbide, A. de, 'Agustín de Iturbide' (in *American Catholic Historical Society of Philadelphia, Records,* Vols. XXVI–XXVII, Philadelphia 1915–16); Navarro y Rodrigo, C.; 'Agustín de Iturbide, etc.' (Mexico 1906).

ITUREA, ĭt'ū-rē-ą, Palestine, the historical name of the district now called Jedur, between Mount Hermon and the Ledja mountains of Bashan, to the northeast of the Sea of Galilee. The Itureans were semi-nomadic Arabs, supposed to have been descendants of Jetur, a son of Ishmael, who had migrated northwards from Medina. In the 2d century B.C. they were subjugated by Judas Aristobulus "the friend of the Greeks" and king of Judea who added their land to his kingdom and compelled them to accept Judaism. In 20 B.C. the district came under the rule of Herod (a grandson of Herod the Great), and at his death 4 B.C., fell to his son Philip, who is mentioned by Luke iii, 1, as tetrarch of the Iturean and Trachonitic region. In 44 A.D. the district became part of the Roman province of Syria, and many of the inhabitants became soldiers in the Roman legions. They were celebrated as archers, brave and fearless, often mentioned on 1st and 2d century inscriptions. Marc Antony is accused of attempting to intimidate the Roman senate with his Iturean guards by Cicero in his 'Philippics.'

ITZA, a Mayan people of northern Guatemala. They came thither from Yucatan in the 15th century after the fall of the Maya Empire and settled on the shores of Lake Petén. Cortés saw them in 1525 but the Spaniards did not subdue them until Ursua took and pillaged their city in 1697. The records of this people date back to the 5th century and references to them are frequent in all Maya chronicles. Many of their records were destroyed by the Spaniards at the time of the conquest.

ITZCOATL, first Aztec emperor: His reign began in 1427. He formed a confederacy with the rulers of Acolhua and Tlatelulca against Maxtla of Tepanec, whom they captured after a short campaign and sacrificed to their gods. Itzcoatl instituted many reforms and greatly improved the state of his realm. He died about 1440. Consult Bancroft, H. H., 'Native Races' (Vol. V, San Francisco 1882).

ITZEHOE, town of Schleswig-Holstein, on the Stör, 30 miles northwest of Hamburg. Its industrial establishments comprise cement factories, carpet mills, soap works, chemical works, foundries, cigar factories, sugar mills, ship yards, etc. It carries on a considerable trade in cattle, grain, lumber and wine. It contains an ancient church and Rathaus. It grew around a castle erected here in 809 and is consequently the oldest town in Holstein. It received municipal rights in 1238. Pop. 16,500.

IUKA, ī-ū'ką, Miss., a village on the Memphis and Charleston railroad, in the northern part of the State, about 115 miles east of Memphis, was the scene of a severe engagement during the Civil War. Early in September, 1862, it was occupied by a small Union regiment as an outpost. On the morning of 13 September Gen. Sterling Price, moving north from Tupelo with a force of 14,000 men, to prevent Grant from sending reinforcements to General Buell in Kentucky, drove the Union regiment from the village and occupied it, and on the 19th was about moving to Rienzi on the Mobile and Ohio Railroad to form a junction with Earl Van Dorn's army preparatory to an attack upon Corinth. General Grant had been closely watching the movements of Price and Van Dorn, and when he heard that Price had occupied Iuka he determined to attack and cut him off before he could effect a junction with Van Dorn. General Rosecrans, who was near Corinth with 9,000 men, was ordered to move south to Rienzi and Jacinto, then eastward, and, marching on the roads from Jacinto and Fulton, to attack Iuka from the south. General Ord, with 6,000 men, was to move along the Memphis and Charleston Railroad to Burnsville, thence by roads north of the railroad, and to attack on the north and west of Iuka. Grant accompanied Ord, who reached Burnsville on the 18th, and encamped within six miles of Iuka, which he proposed to attack early in the morning; but Grant, hearing that Rosecrans had been delayed in his movements and would not probably be up in time to attack next day, instructed Ord not to move to the attack until the sound of Rosecrans' guns was heard south of Iuka. Rosecrans, with the two divisions of Hamilton and Stanley, moved from Jacinto at 5 o'clock in the morning of the 19th and, after a march of 18 miles, at 4 P.M. his advance division (Hamilton's), about two miles south of Iuka, encountered Little's division of Price's command, Maury's division remaining in the north of Iuka, to confront Ord. Little, who was killed early in the engagement, had about 4,000 men, with which he attacked Hamilton vigorously before the latter could complete his lines. After a very severe fight, Hamilton was driven back some 600 yards, abandoning nine guns; but, receiving three regiments of Stanley's division as a reinforcement, he rallied and regained part of his lost ground, when darkness ended the fighting. General Prince reports: "The fight began, and was waged with a severity I have never seen surpassed." Price prepared to renew the battle in the morning; but, convinced by his subordinates of the critical position he was in with Rosecrans in his front and Ord in rear, retreated southward by the Fulton road, which Rosecrans had failed to close as was intended. Ord did not hear the sounds of battle on the 19th, but, advancing on the morning of the 20th, found that Price had escaped. Price retreated southward and reached Baldwyn 23

September. Rosecrans and Ord returned to Corinth. Rosecrans reported a loss of 141 killed, 613 wounded, and 36 missing. Price reported a loss of 86 killed and 408 wounded; Union estimates placing it much higher. There were also a number of other engagements and skirmishes near Iuka a various periods of the war, notably on 22–23 May, 13, 16, 20, 27 Sept. 1862; 7, 14 July 1863; 9 Jan., 17, 18 Feb. 1865. Consult Grant, U. S., 'Personal Memoirs' (2 vols., New York 1895); Greene, F. V., 'The Mississippi' (New York 1882); Johnson, R. U., and C. C. Buel, ed., 'Battles and Leaders of the Civil War' (4 vols., New York 1888); Maury, D. W., 'Battle of Iuka' (in *Southern Magazine*, Vol. II, p. 598, Baltimore 1872); Neil, H. M., 'A Battery at Close Quarters' (Columbus 1909); United States, Conduct of War, Committee on, 'Report of Investigation upon the Military Campaigns of Major Gen. W. S. Rosecrans' (Washington 1865); United States, War Department, 'The War of the Rebellion, Official Records' (Ser. I, Vol. XVII, part 1; Atlas, Washinton 1886–95).

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IVAN, ē-vän', the name of several rulers distinguished in Russian history. IVAN I, *Kalita* (Money-Bag), d. 1341. He was prince of Vladimir, Nishni Novgorod and Moscow, and later became Grand Duke of Moscow and extended his dominions with the assistance of the Tartars. His younger son, IVAN II (b. 1326; d. 1359) became Grand Duke in 1353. IVAN III (b. 1440; d. 1505) succeeded his father Basil as Grand Duke of Muscovy in 1462. He was one of the most astute of the early rulers of Russia, extended the rule of Muscovy over the republic of Novgorod and all its possessions including all of northern Russia (1478), over many of the other small principalities surrounding Muscovy, and over part of Lithuania (1503). In 1480 Ivan refused to pay the annual tribute to the Tartar Khan, which action, in spite of two attempts on the part of the latter to maintain his sovereignty by force of arms, resulted in the liberation of Muscovy from the Tartar yoke. As a result of Ivan's second marriage to a daughter of Thomas Palaeologus, brother of the last Byzantine emperor, autocratic forms of government and court ceremonies gradually developed at Moscow. Ivan did much to introduce western civilization into his domains and was also responsible for the compilation of the first Russian law code. IVAN IV, "The Terrible": b. 25 Aug. 1530; d. 17 March 1584. He was the grandson of Ivan III and succeeded his father, Basil III, in 1533. In 1544 he ended the regency and assumed the government himself. On 16 January 1547 he was crowned as the first Tsar of Russia. He conquered Kazan in 1552 and Astrakhan in 1554. His efforts to acquire additional territory in Livonia and Esthonia, though carried on with large forces from 1560–82 almost without intermission, failed as a result of the stout resistance of Poland and Seveden. It was during his reign that the conquest of Siberia was started (1581). Ivan IV was a peculiar mixture of political sagacity, admiration of western civilization and eastern barbarity. He was an indefatigable worker, comparatively well educated, but possessed such a strong strain of cruelty and immorality that it amounted at times almost to madness. Amongst his many barbarous deeds was the almost complete destruction of Novgorod and the slaughter of thousands of its inhabitants as punishment for an unproven attempt at revolution (1570). Another deed of similar nature was the killing of his son Ivan by a blow, given in a moment of uncontrollable fury, in spite of the fact that he was deeply attached to this son (1580). Twice during his rule (1565 and 1580) he publicly expressed a desire to abdicate, but was persuaded to continue on the throne. The next Russian Tsar, bearing the name Ivan, was IVAN V (b. 27 Aug. 1666; d. 29 Jan. 1696). He was a half-brother of Peter I, with whom he shared the throne for some time, but being weak, both physically and mentally, he took no active part in the government of Russia. One of his five daughters, Anne, later ascended the throne as empress. Her great-nephew, the son of grand-duchess Anne and Duke Anton Ulrich of Brunswick-Bevern, became IVAN VI (b. 24 Aug. 1740; d. 5 Dec. 1764). His great-aunt appointed him her successor and upon her death, 17 October 1740, he was proclaimed tsar under the regency of Ernest Johann Biren, Duke of Courland. The latter was overthrown by the young tsar's mother who assumed the regency in November 1740. In December 1741 Elizabeth became empress as a result of a *coup d'état* and the young tsar was sent to prison, first at Riga and Dvinsk, then at Kholmogory, and at last in the fortress of Schlüsselburg. There he was murdered by some officers in whose charge he was put to forestall an attempt to liberate him, after having been kept in solitary confinement for more than 20 years. (See RUSSIA). Consult Bain, R. N., 'The First Romanovs' (London 1905); id., 'Slavonic Europe; A Political History of Poland and Russia from 1447 to 1796' (Cambridge Historical Series, No. 5, Cambridge 1908); id., 'Russia under Anne and Elizabeth' (in 'Cambridge Modern History,' Vol. VI, p. 301, Cambridge 1909); Bury, J. B., 'Russia, 1462–1682' (in 'Cambridge Modern History,' Vol. V, p. 477, Cambridge 1909); Farrer, J. A., 'Ivan IV' (in *Gentleman's Magazine*, N. S. Vol. XLI, p. 168, London 1888); Green, R., 'Ivan the Terrible' (in ibid., N. S. Vol. LII, p. 569, London 1894); Hötzsch, O., 'Catharine II' (in Cambridge Modern History,' Vol. VI, p. 657, Cambridge 1909). Manvillon, E. de, 'Histoire de la Vie d'Iwan VI' (Paris 1766); Pember, A., 'Ivan the Terrible' (London 1895); Pierling, P., 'Rome et Moscou, 1547–79' (Paris 1883); id., 'Le Saint-Siège, la Pologne, et Moscou, 1582–87' (Paris 1885); id., 'La Russie et l'Orient, etc.' (Paris 1891); id., 'La Russie et le Saint-Siège' (3 vols., Paris 1896–1901); Ramband, A. N., 'Histoire de la Russie' (Paris 1878; translated into English by L. B. Lang, 2 vols., London 1879); Rappaport, A. S., 'Mad Majesties, etc.' (London 1910); Schiemann, T., 'Russland, Polen, und Livland bis ins 17 Jahrhundert' (2 vols., Berlin 1886); Strahl, P., und E. Hermann, 'Geschichte des Russischen Staates' (4 vols., Hamburg 1839–53); Waliszewski, K., 'Ivan le Terrible' (Paris 1904; translated into English by M. Loyd, Philadelphia 1904).

There is also an extensive literature in Russian, practically none of which has been translated into any western language. An exhaustive bibliography of it and of Russian and for-

eign documents referring to the times of the six Ivans will be found in 'Cambridge Modern History' (Vols. V and VI, Cambridge 1909), mentioned above.

IVANGOROD, Poland, a town and fortress on the Vistula at its confluence with the Wieprez, 60 miles southeast of Warsaw, province of Sedcle. This fortress marked the furthest point of the invasion of the Austro-German forces on the eastern front in the great struggle of 1914–18. Pop. 5,500.

IVANHOE, ī'văn'hō. 'Ivanhoe,' written by Sir Walter Scott and published anonymously in 1820, is a story of love and adventure in the days of chivalry. Following his usual practice in the historical novels of interweaving a fictitious romance with actual events, and coloring the whole with the manners of the time, Scott has in 'Ivanhoe' produced a picture of the chivalric age which, besides being full of entertainment, serves more effectively than any merely literal history to make the Middle Ages a vivid reality to the imagination. The work is, especially for young students, an excellent introduction to the study of the feudal period in England, and it contributes much toward laying a foundation for the appreciation of romantic literature. Hence its almost universal use as a text book in the English courses in our high schools.

The period which Scott has chosen is the late 12th century, when the two elements of English society have not united in a common national life. The Saxons, dispossessed of their old inheritance but still constituting the sturdy body of the English people, are set against the Norman conquerors, brilliant feudal lords, endowed with all the knightly graces but haughty and tyrannical Of each of the two contrasting groups Scott has given a memorable picture. The scene changes from the patriarchal home of Cedric the Saxon, with its rough hospitality and home-spun comforts, in which master and serf live on terms of kindly familiarity, to the Norman castle, with its courtly life of hall and bower and the dark mysteries of its gloomy dungeons, then again to the leafy forest, where Robin Hood and his merry men lead the lawless but honorable life of the greenwood. The chief historical event involved in the story is the return of the heroic Richard I to England. By seizing the throne from his unpopular brother John, Richard restores justice to the realm and wins the loyalty even of his Saxon subjects.

The fiction of which Ivanhoe is the hero is less interesting than the historical setting and atmosphere which envelope it. The Knight, Ivanhoe, son of Cedric, has been disinherited by his father because of his love for the noble Saxon heiress Rowena, whom Cedric hopes to marry to Athelstane, a descendant of Edward the Confessor, thereby uniting the Saxon factions and restoring the ancient monarchy. At the opening of the story Ivanhoe has returned to England from Palestine, where he has won the favor of Richard, disguised as a palmer. Furnished with a suit of armor by the much persecuted Jew, Isaac of York, he appears at the tournament at Ashby, where, after being wounded and forced to reveal himself, he is crowned victor by Rowena. On their return from the tournament the whole party of Cedric is captured and imprisoned in the castle of Torquilstone by a band of Norman nobles led by De Bracy, who attempts to force Rowena to marry him by threatening the life of Ivanhoe. At the same time the Templar, Brian de Bois Guilbert, seizes Rebecca, daughter of Isaac, and tries in vain to make her his mistress. Meanwhile the castle is attacked by Robin Hood, who, under the name of Locksley, has won the prize for archery at the tournament. Rebecca, who loves Ivanhoe and is nursing him to health by her oriental arts, describes to him from a window the progress of the siege. At length the castle is set on fire by Ulrica, a half crazed Saxon hag, seeking vengeance on the Normans. The Templar flees with Rebecca to the Preceptory of Templestowe. The Jewess is there condemned to death for sorcery and De Bois Guilbert is commanded to appear in the lists against her. He offers to save her if she will accept him, but she refuses and is about to be burned at the stake when suddenly Ivanhoe, still weak from his wounds, appears dramatically as her champion. De Guilbert falls dead at the first encounter and Rebecca is released. Meanwhile John has received word that Richard is in England. The king had in fact been present at the tournament and performed remarkable deeds of valor disguised as The Black Sluggard. Barely escaping by the intervention of the outlaws from a plot of John's to assassinate him, he now reveals himself, resumes his authority, and punishes the traitorous adherents of Prince John. Cedric, whose hope of restoring the Saxon dynasty has fallen with the return of the popular Richard at last consents to the marriage of Ivanhoe and Rowena.

The story is rich in incident and full of stirring adventure. If the hero and the heroine are somewhat insipid, the other figures, whom Scott sees chiefly in their historical and typical aspects, are vividly portrayed and thoroughly interesting.

Consult Hutton, R. H., 'Sir Walter Scott' ('English Men of Letters Series'); Lockhart's 'Life of Scott'; Young, C. A., 'The Waverley Novels'; Essay by Bagehot, W., 'Literary Studies' (Vol. II); Stevenson, R. L., "A Gossip on Romance" (in 'Memories and Portraits'). For complete bibliography consult 'Cambridge History of English Literature' (Vol. II).

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IVEAGH, Edward Cecil Guiness, Baron, Irish philanthropist: b. 10 Nov. 1847. He is a son of Sir B. L. Guinness (q.v.). In 1891 he became Baron Iveagh. He gave $1,250,000 for the purpose of erecting sanitary dwellings for working people at a low rent. Of this sum $1,000,000 was to be given to London, and the remainder to Dublin. The income obtained on the capital is to be employed in the same fashion.

IVERACH, James, Scottish theologian: b. Caithness, 1839. He received his education at the University of Edinburgh and at New College. In 1869 he was ordained minister of the United Free Church and from 1874 to 1887 held a pastorate at Ferry Hill, Aberdeen. From 1887 to 1907 he held the chair of apologetics at the Free Church College of Aberdeen; becom-

ing professor of New Testament language and literature in the latter year at the same institution, of which he also served as rector from 1905. His publications include 'Evolution and Christianity' (1884): 'Life and Times of Saint Paul' (1890); 'The Truth of Christianity' (1895); 'Theism in the Light of Present Science and Philosophy' (1899); 'Descartes, Spinoza, and the New Philosophy' (1907) and numerous papers in the *Spectator*.

IVES, īvz, **Frederic Eugene,** American inventor: b. Litchfield, Conn., 17 Feb. 1856. He received a public school education; was director of the photographic laboratory at Cornell University in 1874–78, and lectured with distinction before scientific societies in this country and in England. Among his inventions are the process of half-tone photo-engraving (1878); the three-color printing process in the typographic press, and also the parallax stereogram. His honor awards include the inscribed gold testimonial of the International Photo-Engravers' Association (1911); the Cresson gold medal of the Franklin Institute, Philadelphia; special gold medal of the Photographic Society of Philadelphia; the Progress medal of the Royal Photographic Society of London and the Science medal, for work in color photography; the Scott legacy medal of the Franklin Institute for the parallax stereogram; the Rumford medal of the Academy of Arts and Sciences for inventions in color photography and photo-engraving, besides 14 other medals from scientific societies for various inventions and discoveries. His published 'Isochromatic Photography with Chlorophyll' (1886); 'A New Principle in Heliochromy' (1889), etc.

IVES, Levi Silliman, American clergyman: b. Meriden, Conn., 16 Sept. 1797; d. New York, 13 Oct. 1867. He served a year in the army in the war of 1812–15, was educated at Lowville Academy, entered Hamilton College to prepare for the ministry of the Presbyterian church in 1816, withdrew on account of feeble health, joined the Protestant Episcopal Church in 1819, was ordained priest in 1823, and elected bishop of North Carolina in 1831. In 1848–49 he exhibited such strong sympathy with the Tractarian movement in England, that he was brought into antagonism with the majority in his diocese. Bishop Ives was arrainged for his views before the convention of the Episcopal church. His explanation were accepted for a time, but in 1852 he visited Rome and made his submission to Pius IX. Thus at the age of 58 he sought admission as a layman into the Catholic Church "with no prospect before him, but simply peace of conscience and the salvation of his soul." His wife also was converted to the old faith. After his return to New York he became professor in Saint John's College, Fordham, and lecturer in the convents of the Sacred Heart and the Sisters of Charity. He was one of the founders and first president of the Catholic Protectory for Destitute Children. He published a catechism for the slaves in North Carolina; 'Manual of Devotion'; 'Humility a Ministerial Qualification' (1840); 'Sermons on the Obedience of Faith' (1849); 'Trials of a Mind in its Progress to Catholocism' (1853); 'Letter to his Old Friends' (1853). Consult Shea, J. G., 'The Catholic Church in the United States' (New York 1856).

IVIMEY, ī-vī'mē, **Joseph,** English Baptist clergyman and historian: b. 22 May 1773, at Ringwood, near Southampton; d. London, 8 Feb. 1834. For a time he followed in his father's footsteps and was a tailor. He became a Baptist minister in 1794. For 29 years he was pastor of the Baptist church in Eagle street, Holborn, London He was a leader in the anti-slavery and missionary movements. His principal works include 'The Life of John Bunyan' (1809), which was the chief authority for many years: 'History of the English Baptists' (4 vols., 1811–23); 'The Life, Times and Opinions of John Milton' (1833). Consult Prichard, George, 'Memoir of the Life and Writings of Joseph Ivimey' (London 1835).

IVIZA, an island of the Balearic group (q.v.).

IVORIES. On account of the fineness of its grain, warm tone, the polish it easily acquires, its adaptability to carving, and its incorruptibility, ivory has been a favored medium for plastic art work from the very earliest times. In ancient Egyptian and Assyrian reliefs we see representations of conquered Ethiopians bringing elephant tusks as tribute. In Egypt and Mesopotamia have been found ivory carvings of idols and utensils. But the oldest graphic work on ivory extant is prehistoric and derived from the "cave-dwellers" when elephants inhabited Europe. Such pieces have been discovered in caves in the Dordogne (France), others in Switzerland. Incised on these pieces of tusk are outlines of reindeer, mammoths, etc. In the Grotte du Pape (France) was found the carved torso of a woman; and so on. In the museums at London, Paris, Cairo, etc., are goodly collections of ivory work done in the early Dynasties of the Egyptians. Two specimens in the Louvre are supposed to be a pair of clappers or castanets; one has rudely incised outlines of figures; the other has a head carved in relief and its extremity is carved in the shape of a beautifully formed hand. The British Museum has two daggers ornamented and inlaid with ivory dating back to the Pharaoh of the Exodus; in the Louvre are a small vase, spoons, toilet boxes, etc. Next in date are pieces from Assyria, of which 50 remarkable pieces of ivory from Nineveh are in the British Museum; they were taken from the ruins of the Palace of Nimrod and have evidently suffered badly from fire. In the collection are fragments of winged sphinxes, plaques from a throne or couch, probably; a lion's head, portions of bulls' bodies, human heads, hands, legs, etc. Other museums have daggers, sword handles, sceptres, musical instruments etc. The ancient Greeks used ivory on their large statues putting gold on the marble form for clothing and ivory for the flesh parts — they called the work "chryselephantine"; nothing is extant but the records. The Roman consular diptychs are the earliest refined ivory carving existing, with few exceptions. Probably of the 3d century A.D. is the beautiful statuette of Penthea in Cluny Museum; it is 15 inches high. The ancient head of a woman in the Vienna Museum is of fine workmanship, nearly half natural size. Found in Etruscan

tombs (Chiusi and Calvi) are a few ivory examples dating, probably, back to the 4th century B.C., such as a Gorgon head with eyes of gold inlaid, horses' heads, lions, parts of mirrors and caskets, a large bust of a woman, all in the style of Greek art. And the Greeks used ivory, for Homer, in his Odyssey, speaks of the artisan Icmalios, goldsmith of Ithaca, making a chair of ivory and silver on which Penelope sat. Solomon's throne appears to have been of ivory. The Roman curulean chairs were frequently of ivory. Most noted of the early Roman carved ivories are the "diptychs" or writing tablets; they consisted of two tablets folding over one another and fastened together loosely on one side. Their carved external sides give a representation of a consul, scenes of public games, fights, etc., the inner side being plain and covered with wax on which to write notes with the *style*; they measured about 12 inches by 5 or 6, and were strong and thick. The most important, perhaps, of the early diptychs extant is that in the Liverpool Mayer Museum; its lower bas-relief depicts men fighting stags in the arena, above are three persons in a gallery. It has been attributed to the 3d century. Another early diptych (the other may not have been *consular*) extant is that dedicated to Marcus Aurelius Romulus Cæsar (308 A.D.), in the British Museum; it represents a funeral procession and above is the apotheosis of the consul driven in a four-horse chariot to Heaven. Altogether about 50 diptychs dedicated to consuls are extant. Some are to the following: Consul Rufus Probianus (322 A.D.), typically seated with scribes attendant; Amicius Probus (406); Flavius Felix (428 A.D.); respectively in Berlin, Aosta and Paris. Of the consul Areobindus (506) no less than eight diptychs are extant. A number of existing diptychs were carved for private individuals, and these are often superior, as works of art, to those carved for consular adulation. Three lovely early diptych specimens are known as the Bellerophon, Aesculapius and Hygyeia, and the Bacchantes, in the museum at Kensington and that of Liverpool. They are of beautiful workmanship, and belong to those usually designated as "classical diptychs." An ivory curule chair and ivory sceptre were frequently given by the Roman Senate to tributary sovereigns.

Early Christian and Byzantine Ivories.—The first ivory carvings of the Christians were, of course, "transitional," showing many of the former pagan features as well as copying the style, as they are contemporaneous till we come to the developed Byzantine style. Early Christian diptychs gave the names of those baptized, some gave the names of bishops and benefactors, martyrs, saints, others recorded the names of the dead. Several cylindrical pyxes (caskets), made from a section of elephant tusk, exist that are beautifully carved; one in the Berlin Museum has reliefs of the Saviour enthroned, Saint Peter and Saint Paul on curule chairs, other apostles standing around, etc. Four small ivory plaques of great interest are in the British Museum and contain carvings that depict events in the history of Christ (Crucifixion, etc.); they date somewhere between the 5th and 8th century. The leaf from the diptych of Rambona in the Vatican is a 9th century production and shows a bust of the Saviour with hand in act of benediction, an allegorical sun and moon holds a torch each, and, strangely, below is a wolf suckling two children with the inscription "Romulus and Remus nourished by a wolf," in Latin. These plaques are frequently used as book-covers (a 9th century example is in the Bodleian Library, Oxford; a 14th century one in the British Museum is perhaps the most beautiful). The "Nativity" was one of the favorite subjects with ivory carvers; one, a plaque of Rhenish execution, in the Cologne Museum dates from the 11th century. Of Byzantine ivories there are few after the 10th century, then come several of Russian origin. We cannot fail to note that the religious stiffness and conventionalism of Byzantine works, are little present in the ivory reliefs; there is a freedom of action and resemblance to nature quite remarkable and different from art expressed in other mediums. In the British Museum is, perhaps, the most noted of these carvings; it represents an archangel holding an orb in one hand and a long rod in the other. This is one of the largest known (16¼ inches by 5½) and dates about the 4th century; it doubtless is part of a writing tablet, as the Greek inscription reads "Accept this gift, and having learned the cause," proving that another plaque is missing, which contained the rest of the sentence. The noted Brescia casket in the Quiriniana Library, Brescia, is a 5th or 6th century work; it has an overelaborated top and sides, but in classic style. Busts range round the upper part, two scenes of Jonah and the whale, the Saviour, Magdalen, Good Shepherd and sheep, story of Susannah, all in bewildering closeness. The Episcopal chair of Maximianus (546) at Ravenna from Assyrian workers, apparently) is of ivory with beautifully carved panels. A superb archangel Saint Michael in the British Museum is attributed to Antioch artists. In Byzantine style is the Carlovingian 9th century ivory bookcover in the Victoria and Albert Museum (London). The centre panel displays a Virgin and Child and a figure on each side, architectural columns are the frame, beautiful figures of angels float on the top panel. The Vatican owns a bookcover very similar but claimed as three centuries earlier. The 11th century Byzantine triptych in the Paris Cabinet de Médailles is claimed to be the most beautiful specimen of extant Byzantine art. The central division has a Crucifixion with the Virgin Mary and Saint John on either side, all of the characteristic "elongated" anatomy and straight close folds of drapery; Constantine and Empress Helen are in diminutive size below. The statuettes in the Byzantine shrine from the Soltikoff collection are some of walrus tusk and some of elephantine ivory. The Russian Church would be expected to furnish numerous specimens of Byzantine ivory carving; it affords however, only a few heads of pastoral staffs, plaques and other liturgical accessories. A 16th century *panagia* (a flat locket-shaped receptacle to hold the consecrated bread) of ivory in the Vatican has 10 scenes from the New Testament carved in the minutest form with great skill and producing facial expressions clearly. These surround a larger central circle containing three angels sitting at meat with Abraham. Two thrones in the Kremlin at Moscow are of ivory. One, attributed to Constantinople (1472), is the

Ivan III throne; its plaques were added and dated 16th to 17th century. The other probably comes from Persia and is covered with ornaments of gold and gem stones. Plaques of ivory of Hindu workmanship are on front and sides, picturing an elephant hunt amongst open interlaced work. Saint Peter's ivory chair is in the Basilica (Rome). It is a massive square structure, the low back supporting a triangular pediment. Square ivory plaques covering the surface depict the labors of Hercules and six constellations.

Ecclesiastical Diptychs.— It is to the custom, which dates back to very early times of the Church, of using ivory plaques (both "consular" and "classical") for liturgical decoration that so many have survived; later, when no longer used, fortunately, these works of art were carefully preserved in the treasuries of the churches. But diptychs have *palimpsests* just as do manuscripts (see MANUSCRIPTS) and sepulchral brasses (see BRASSES). In these certain parts of a carved diptych that are not desired are planed down and other work substituted. An example in the Victoria and Albert Museum, London, has all its original reliefs erased but traces remain of a consul's figure; a figure of the Saviour in 13th century Russo-Byzantine is carved on the back. Another such in the Liverpool Museum has the original substituted by an inscription to Bishop Baldricus (10th century). The cathedral at Monza has two leaves of another.

Gothic Ivories.— In the 13th, 14th and 15th centuries we come across Gothic architectural effects in the carving. For liturgical purposes we meet with ivory in diptychs, triptychs, retables or altar-pieces, pastoral staffs or croziers, shrines, statuettes, caskets, bookcovers, liturgical combs, portable altars, holy-water buckets (*situlæ*), flabelli (fans), rosary beads, etc. The quality of the workmanship varies considerably, the French being best. In France, the Revolution destroyed most pieces; in England, the Reformation. Noted extant pieces of this period are the cylindrical pyx in Saint Gereon treasury, Cologne; a 13th century casket, in the museum at Kensington, of wood overlaid with ivory plaques painted and gilt, showing Saint Felix enthroned, etc.; two fine caskets (in the latter museum), one with the figures of Christ, Saint Peter and Saint Paul in richly carved canopies ("tabernacles") of Gothic architecture. There are also *polyptyches* (with more than three leaves) which often form a recess in which is a statuette or group; these are termed "shrines." Germany and Italy did splendid work in such pieces. Nothing of great art value in diptychs or shrines later than the 14th century has come down to us. Charming statuettes exist of the Gothic period as found in the museums of Paris and London. The Virgin and Child is a favored subject for ivory statuettes, the Virgin is frequently standing and has a tendency to lean over above, utilizing to the full the curve in the tusk; some are seated. Some of these are colored, even gilded. The "Vierge de Bourbon" (Louvre) is very noted, it is a "Vierge ouvrante," a style in which the figure can be opened in the centre producing two doors and disclosing groups carved in the interior. The Saint George and dragon group was another favorite with ivory carvers; this is usually thus divided: there is a hillock with castles above, lower we find the kneeling princess praying for delivery and at base Saint George is slaying the dragon, all in full relief. The Wallace Museum, London, has one of these of the 15th century, the Salting Collection had a smaller one. The Coronation of the Virgin (Louvre) from the Soltikoff Collection is very noted, the Christ figure is said to be a portrait of Philip III, and the Virgin a likeness of Mary, daughter of Henry III. A number of "Deposition from the Cross" groups in ivory are in existence, in Byzantine and Western style, in panels as well as diptychs, triptychs and caskets.

Secular Art in Ivory.— Caskets for secular use from the 13th century with carved panels and borders exist; they are frequently carved with classic subjects, as the stories of Europa, Orpheus, Pegasus, with figures of centaurs and other monsters. Noted secular caskets are in the Brussels Museum, British Museum (the "Franks" casket) and that in the Brunswick Museum, with their inscription in Runic and interlaced work. In the 14th century we come to the decoration depicting the era of classic romance, such as the story of King Arthur and his knights of the Round Table, and we get portrayals of the Quest of the Sangreal, Queen Guinevere, Tristan and Yseult, etc., also Chaucer's Romance of the Rose, tournaments, knights before the Castle of Love, etc. All these are reproduced in the carved ivories of this period. In the museum at Kensington is a casket with 13 panels of classic and romantic subjects such as Castle of Love, Cupid shooting, romance of Lancelot, story of Tristan as a beggar, Fountain of Youth, etc. Numerous 15th century Italian marriage coffers (*cassone*) of bone are in the museums. Mirrors and hair combs extant show quite elaborate scenic carving. Olifants, too, belong to this period, some from the 12th century. They retained the horn shape and were used for hunting horns and often for drinking from; they show profuse carving at times.

Noted Ivory Sculptors.— François Girardon (17th century) is supposed to have created the famous crucifix in the archiepiscopal palace at Troyes; a replica or the original is in Sens Cathedral. Joseph Villerme (d. 1720) of Saint Claude carved crucifixes exclusively and his work is extant in a number of churches in France. Other noted crucifixes are: one in Calvet Museum, Avignon, by J. B. Guillermin; high altar at the Sorbonne, Paris, by F. Anguier; in Saint Germain-des-Près Hospital, Paris, by Simon Jaillot. Famous German crucifix carvers were: Andreas Feistenberger (created beautiful crucifix of the archbishop of Tours); his work is supposed to be the greatly admired crucifix in the Benedictine abbey church at Downside, near Bath (19 inches high); another was Georg Petel (example in Imperial Vienna Museum); Melchior Barthel (in Florence Museum); Balthasar Permoser (Brunswick Museum); Bernhard Bendel (Frankenkirche, Munich). The "Flagellation" scene was a chosen subject for ivory carvers.

Post-Renaissance Ivories.— In the 17th century we get the strong Italian influence bearing on all Christian art, the religious intensity in art is now displaced by appeal to the eye more than the mind. The nude enters largely into the treatment of figure work. But the art

of ivory carving enters its decline to become decadent by the 18th century (rococo and baroque). In the 17th century we have a series of antique subjects, gods and goddesses, bacchanals, satyrs, mostly of inferior talent but frequently of fine execution and some pieces of remarkable art value and originality. Examples are plentiful, for they had a popular demand. And ivory found its uses not only in statuettes and groups but for furniture decoration and inlays, for tankards and ewers, for busts, portrait medallions, caskets, chessmen and draughtsmen, handles for arms, turnery, etc. The wealthy German princes encouraged the art, some even took ivory artists into their court retinue. Of such were Augustus the Pious, Elector of Saxony, founder of the Dresden "Green Vaults"; Maximilian, Elector of Bavaria; the princely family of Fuggers; Ferdinand of Bavaria; Elector Georg Wilhelm of Brandenburg. Augsburg, Munich, Nuremberg became centres for ivory work, also Geislingen, Ulm, Stuttgart and Gmünd. France had as centres Dieppe, Saint Claude, Rouen. A few works worth citing are: the allegorical group of Christoph Maucher (Vienna) showing princes in wigs alongside holy persons, cherubs, scrolls, garlands, angels blowing trumpets; the Louis XIII sceptre (Londesborough Collection), an elegantly formed hand; a German 16th century dagger; a Nuremberg cup held up by a mermaid, some horns. In the museums of Nuremberg, Cassel, Gotha, Brunswick, Carlsruhe, Vienna, are good collections, also in Dresden, Berlin and Munich are fine pieces. Of Flemish work we have 16th century pieces of François Duquesnoy (called Il Fiamingo), six are in the Museum at Kensington, his favorite subject was youthful satyrs and naked children playing; his Diana and her nymphs bathing is very beautiful. Lucas Fayd'herbe, another Fleming, is supposed to have executed the piping Pan group in the Madrid Prado Museum, but his best work is in tankards and standing cups with satyr processions and dances in the museum at Kensington and other museums. Gerhard van Opstal (d. 1698), also Flemish, worked in Paris; his bacchanal figures, amorini and Venuses, etc., are full of charm. Other clever and noted carvers are François van Bossuit (Dutch), and the Germans, Christoph Angermair (with his wonderful cabinets, called *Kunstschränke*), Georg Petel, Leonhard Kern, Bernhard Strauss, Balthasar Permoser, Ignaz Elhafen, etc. Lathe or turned work in ivory shows considerable skill in technique in this period; noted workers were: the Zick family, Lorenz and his sons, Martin Teuber, Fil. Senger, etc. Their extant examples show tours-de-force aided by rose-engine lathes, ellipse chucks, and other mechanical means. With the Spanish, ivory has not been a favorite medium for art work. The Moors, however, with the conquest brought the technique, as we see in openwork boxes, in which Oriental or Mohammedan treatment is evident, as well as the Cufic inscriptions.

Oriental Ivories.— India, as the home of the elephant, was naturally fond of using ivory in decoration. As with all other civilized nations, India's arts are bound up with her creed; as the Christian carvers depicted Bible scenes, so the Indians found motifs in Buddhas, Krishnas, Vishnus, Ramas and other monster gods and goddesses of Hindu mythology. On account of their monotonous frequency and absolute similarity of expression, Indian art does not appeal to all western minds as does their own much variegated, historical field of pictorial work. Again, in its purely ornamental work its *repeat* treatment tends to soon pall on the untrained western eye. The barbaric profusion of detail covering the entire surface, also, is against Occidental tenets. And, perhaps above all, the ivory medium does not afford the tonic effect produced by the polychromes seen and enjoyed in the Indian textiles, enamels, lacquers, etc., in their gorgeous splendor. The Indian Museum at Kensington affords examples covering the entire field of Hindu art in ivory and other mediums. Reliefs show lions and elephants surrounded and enmeshed with scroll foliage done in intricate, minute open-work. Benares, Bombay, Delhi, Travancore, etc., are centres for the finer work. Persia appears to have done very little in ivory carving worth notice; her sword handles show, invariably, careful work, almost always in walrus tusk, however. Arab usage of ivory or bone is largely one of inlays, and the Saracenic type of geometrical motifs is displayed on door-panels and furniture to good effect. In combination with ebony and other dark woods very clever effects are seen in arabesque interlacing lines. Coptic screens, the pulpit (nimbar), etc., at Kensington afford us beautiful examples of this work in perfection, the former having carved relief panels of ivory.

China and Japan.—Practically all the carved ivory emanating from China consists of objects prepared specially for the Western markets. Her native "puzzle" balls, which are so carved that a series of different size balls, one within the other, and made of a single piece of ivory (seamless), are familiar objects and proof of skill and patience. Models of ships (*sampans*), dwellings, gardens, seen in museums, are of delicate minute construction. China's Buddhist gods, of course, appear in ivory. While the work of the Celestials in ivory is cold and appeals little to the westerner, Japanese ivories keenly interest us. In her *netsukés* we find a fund of pictorial art, diminutive nature in every detail, idealistic and grotesque, all in perfection though of microscopic proportion. These intricate pictures in relief in buttons are the surprise and admiration of all art students, and their scope in depiction and classification take pages to describe. The Japanese *inros* (medicine or candy boxes) with their tiny drawers, so full of artistry in decoration, displayed in the museums with the netsukés (to which they belong) always attract admiring attention. Japanese figurines and groups (*okimono*), their shrines, screens, sword-scabbards, etc., all show the perfection born only with the enthusiasm of an artist, and the names of these clever carvers have survived in honor in their land.

Recent Work.— The uses of ivory in strictly modern days have been chiefly confined to brush-backs, billiard balls, paper cutters, etc., but good art work still is done in Europe in this medium in such centres as Dieppe and Paris. And, in the quiet of the studio a number of artists of this and last century have

done fine art work in ivory, some allied to the gold and silversmiths. Moreau-Vauthier trained a number of pupils in this art; the shops of Froment-Murice and Falize (Paris) have created talented ivory work. Among artists of genius in this line figure such names as Soitoux, Belleteste, Meugniot, Pradier, Descrieux, Baron Triqueti (high-altar at the Invalides), Rosset, all in France. In Italy, Constantin Meunier, Giuseppe Bonzanigo (1740–1820) trained pupils. Simart's design for the reproduction of the Minerva of the ancient Greek sculptor Phidias was carried out (reduced) in chrys-elephantine work (gold and ivory) by Froment-Meurice for the 1857 Paris Exposition. Other ivory sculptors of note are the Belgians, Julien Dillens, Charles van der Stappen, Phillippe Wolfers, Charles Samuel, Alphonse van Beurden (worked in England), etc. Aside from specialists many leading artists have chosen ivory as a medium for an individual work.

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IVORY, SIR **James,** Scotch mathematician: b. Dundee, 1765; d. 21 Sept. 1842. He was educated at the University of Saint Andrews. For many years he superintended a flax-spinning factory, and in 1804 was appointed professor of mathematics in the Royal Military College at Marlow. He was a self-taught mathematician, and spent much of his time in retirement, studying the writings of the most learned continental mathematicians, and adding to their value by original contributions. His most celebrated paper on the attraction of ellipsoids was published in 1809. Besides this paper he contributed many others on the subject of the attraction of spheroids and the theory of the figure of the earth. One of the last subjects which occupied his attention was the possible equilibrium of a spheroid with three unequal axes, which Jacobi had discovered. Next to the theory of attractions, that of atmospheric refraction, most seriously engaged his attention, its great importance in astronomy and the curious mathematical difficulties which it presents, rendering it of great interest to analysts. In 1819 he was pensioned and retired, and knighthood was conferred upon him in 1831.

IVORY, properly the substance of which the tusks of the elephant consist, though the similar substance constituting the tusks of the hippopotamus and the horn of the narwhal is also so called. There is also a wholly different substance known as vegetable ivory (q.v.). Ivory is prized for its beautiful color, the fineness of its grain and the high polish it is capable of receiving. That of the African elephant is most esteemed by the manufacturer for its density and whiteness. It is used as a material for knife-handles, pianoforte keys, combs, the backs of brushes, billiard balls, chess-men, carved figures and ornamental articles of various kinds. Thin plates of ivory are used as panels for miniature paintings, and etchings are sometimes executed on such plates. The ivory of the hippopotamus is preferred by the dentist. The shavings and sawdust of ivory, by burning in a crucible, are converted into a black powder, from which is prepared a pigment known as ivory black. Ivory may be stained or dyed. The use of ivory was well known in very early ages. The ancients were acquainted with the art of sculpturing in ivory, of dyeing and inlaying it, and they often employed it in statuary. Some of the most famous Grecian statues were chryselephantine, that is, were overlaid with plates of gold and ivory in conjunction. To provide the world's supply of ivory it is estimated that 9,000 to 12,000 elephants are killed annually. The medium weight of a tusk is about 60 pounds, but some are found weighing as much as 170 pounds. See IVORIES.

IVORY, Vegetable. See VEGETABLE IVORY.

IVORY-BILL, the great black-and-white, scarlet-crested woodpecker (*Campephilus principalis*), formerly numerous and greatly admired throughout the southern States, but now surviving only in a few of the most secluded cypress swamps of the Gulf coast. Its extermination was begun by the Indians, who valued highly its splendid head-feathers as an ornament for warriors; and completed by sportsmen and plume-hunters. The books of Wilson, Audubon and early writers on American animals give many interesting facts as to its habits.

IVORY CARVING. See IVORIES.

IVORY COAST, The, West Africa, a colony comprised in French West Africa. It lies between Liberia and the British Gold Coast Colony, and, including the kingdom of Kong, extends inland to the military territories of the French Sudan. The French obtained and asserted rights on the coast about 1843, but did not actively occupy the territory till 1883. Its area is about 130,000 square miles, with a population (1904) of 1,530,754, including 1,163 Europeans. Bingerville is the seat of the lieutenant-governor. There are a number of official schools and some Catholic private schools. The most populous centres are Grand Bassam, Assinie, Grand Lahou, Sassandra, Tabou, all on the coast; and in the interior, Abigean, Aboisso, Tiassali and Korbogo. Bananas, plantains, pineapples and other fruits are cultivated; cocoanuts and rubber are collected and European coffee is grown with success. Mahogany forests are worked and gold is found. Mahogany, palm kernels and palm oil are the principal exports. In 1913 the value of the mahogany exported was $940,222, in 1915 it had declined to $306,846. Lack of shipping facilities, owing to the European War, was the cause of the shrink-

age. In 1912 there were 1,900 miles of telegraph and 420 miles of telephone lines. Telephonic communication exists between Bassam and Bingerville and other places. The budget of the colony for 1916 amounted to $1,299,663. Consult Villanour, R., and Richard L., 'Notre colonie de la Côte d'Ivoire' (Paris 1901); Mounier, M., 'La France noire' (ib. 1894).

IVORY PALM, a South American palm-tree yielding corozo-nuts,—large white seeds called "vegetable ivory" (q.v.).

IVREA, ē-vrā'a, Italy, city of the province of Turin, Piedmont, 38 miles by rail north of Turin. It has an interesting 10th century cathedral, and on the hill dominating the town is the 14th century Castello dello Quattro Torri, now used as a prison. A strategical position of importance on the Dora Baltea where it emerges from the mountains, Ivrea from the earliest times has been prominent in Italian history. It was the headquarters of Napoleon's greatest activity in the Italian campaign of 1800. Pop. 6,100; of commune 11,700.

IVY, a popular name for various climbing, creeping and drooping herbs and shrubs, the most widely known of which are the following: Common or English ivy (*Hedera helix*) is a tall climbing evergreen shrub of the family *Araliaceæ*, widely planted in Europe (where, as in northern Africa and eastern Asia, it is native), and in the warmer parts of the United States, its ornamental, abundant foliage being highly valued for covering walls, rocks and trellises. Its small and inconspicuous greenish, perfect flowers appear late in the autumn and the small black fruits (three to five seeded berries) ripen the succeeding year. The fruits which are devoured by birds, are bitter and pungent and were formerly in medicinal repute. The gummy juice obtained from the stem, as also the fruit, contains the bitter principle hederin and the hederic acid characteristic of the plant. It has been used in making varnish. Contrary to popular opinion, ivy is not parasitic upon such trees as support it. It merely clings to them by its numerous hold-fast roots produced along the entire length of its stems. Such trees as it injures are killed by constriction. The other popular notion that it makes the walls and houses upon which it climbs damp and unhealthy is also erroneous; in reality it dries them, the roots abstracting such water as reaches the wall through the dense foliage; yet exceptional cases of damage occur. It has numerous horticultural varieties which differ mainly in the form, color and markings of the leaves. These succeed best in rather moist, rich soils and shady positions and are not usually found to be hardy much farther north than New York unless well protected from the winter sun, as upon the north side of buildings, etc. As a cool greenhouse and a house plant it is very popular. Ivy leaves and ivy berries were formerly administered for various medicinal purposes, but they have been long out of use. The leaf and habit of the common ivy are so characteristic that reference is often made to them in the specific names of other plants, "ivy-leaved" being common as a designation. The plant takes a prominent place in mythology and folk-lore.

Japanese or Boston ivy (*Parthenocissus tricuspidata*) and its near relative Virginia creeper (*P. quinquefolia*) of the family *Vitaceæ*, are probably the next best known species to which this name is applied. The former is the more graceful, and is gradually gaining in general favor over the latter, which demands more attention to keep it looking presentable. Both climb by means of tendrils, but the Boston ivy clings better to walls. It has three-lobed leaves; its rival, a compound leaf of five-leaflets. Both have brilliant autumnal colors in the north, where the Virginia creeper is the more hardy.

Among the herbaceous ivies Kenilworth ivy (*Linaria cymbalaria*), German ivy (*Senecio mikanoides*), and ground ivy (*Glechoma hederacea*) are best known in America. They are all popular greenhouse plants and are frequently planted in hanging-baskets because of their graceful habits. Poison-ivy or poison-oak is a climbing sumach whose leaflets somewhat resemble those of Virginia creeper, but are in threes instead of fives. See POISON-IVY.

IVY OWL. See OWL.

IVY POISONING, a skin disease or dermatitis characterized by erythema, wheals, papules, vesicles, pustules, bullæ, or a combination of two or more of them, with an addition of crusting and excoriations. It is caused by *Rhus toxicodendron* (poison ivy), a climbing plant and a small tree or shrub (poison oak) are the most common causes in the eastern part of the United States, and also in the West. In the Middle States the poison sumach seems to be the more commonly poisonous one *Rhus venenata* (poison dogwood, sumach elder). The nettle commonly seen in the woods and unkept meadows, the primrose (Primula obconica), the oleander (Nerium oleander), the rue (Ruta), the smartweed (Polygonum punctatum) are the most common ones known, but there are many others.

The inflammatory reaction produced by Rhus toxicodendron (poison ivy) is quite typical and so commonly seen in the springtime and summer that even the ordinary person may make an accurate diagnosis. The disease starts upon the exposed parts primarily. The hands and wrists or forearms are the first members attacked usually, then follow the face, the genitalia, and anal regions; barefooted children are great sufferers also. It is said that toxicodendric acid, a volatile substance, is the cause, although it has not been specifically proved. Many persons who have had at one time or another severe attacks, have found that in passing through the woods, or anywhere in the proximity of the plant, they may have a recurrence of the attack, even though the plant is not touched. As the years pass and there has been no contact made with the ivy, this peculiar susceptibility to the air-laden poison becomes almost nil. There is a belief that after one attack of some severity there is a recurrence at the same time the following year, regardless of any proximity to plants. Probably these are really cases of vesicular eczema. There is a serious tendency in some instances of ivy poisoning to a persistency toward a chronic condition, which, according to our present knowledge of eczema, may be classed as such.

Persons prone to attacks of eczema are very susceptible to the poison. There are in-

dividuals, too, who from childhood have never been subject to plant poisoning, but with change of climate or methods of living, suddenly are rendered susceptible. Then there are those who seem to preserve an immunity to poisonous plants, handling them with perfect impunity.

The poison ivy is a shrub which usually climbs by means of rootlets over rocks, walls, and trees, sometimes low and erect. Leaves are divided into three somewhat four-sided pointed leaflets. This much dreaded plant is often confused with the beautiful Virginia creeper; the two can be distinguished by the three-divided leaves of the ivy and the usually five-divided leaves of the creeper. It is supposed that the ivy is especially harmful in the night or when the sun is not shining directly upon the plant. A more or less mild attack may be ushered in by a burning or itching of the skin. Within a few hours up to 24 or 48, an erythema may appear, followed by swelling, with vesicles, or the vesicles may arise with little areola. The vesicles may be few in number, or clustered in great multitudes on the affected parts. At first they may be tense, but often rapidly become flaccid, rupturing easily. The yellowish serum in the vesicles doubtless carries the poison, as it seems to inoculate nearby previously unaffected areas, spreading the disease. The lesions often develop in streaks or stellate patches slightly raised, surmounted by vesicles. The parts may swell to enormous proportions. The face becomes quite distorted, the eyelids suffer, and conjunctivitis is not uncommon. The suffering from the itching and burning is intolerable. The dermatitis usually progresses to a certain point before regression takes place. Some abortive cases clear up rapidly. After the vesicles rupture and dry the erythema and swelling slowly disappear. The disease may last but a few days or remain from several weeks to several months. Its common duration is from 10 days to three weeks. It often leaves in its wake a mass of freckles or pigmentation such as often follows a sunburn.

In treatment the large vesicles should be evacuated, the secretion being prevented from reaching unaffected parts. Compresses of boric acid or phenol lotions may be used, or a solution of thiosulphite of soda. Lotions with powder suspensions are comforting. Hot compresses of salt and baking soda solution are helpful. A standard lotion is a compound resorcin, one containing boric acid and resorcin, ā ā ʒ i; pulv. zinci oxidi, ʒ i.; aq. calcis q.s. ad ʒ viii. In mild cases healing may be obtained by a simple astringent ointment such as angmentum, zinci oxidi, but ointments as a rule are not so pleasant as lotions.

IWAKURA, ē-wä'koo-ra, **Tomomi,** Japanese reformer and statesman: b. Kioto, about 1825; d. Tokio, 20 July 1883. He was of illustrious ancestry, one of the Kuge or court nobility, chamberlain of the imperial household, and at first in favor of the expulsion of foreigners. He never saw a foreigner until he was 43 years old. Becoming a Progressive, he was banished into exile and shaved his head, but his real aim was to restore the lustre of the imperial throne by the overthrow of the Yedo Shogunate. Entering into communication with the leaders of the confederation of southern daimios, he became the link between court nobility and the progressive samurai or gentry, and took a prominent part in the Restoration of 1868. He was one of the first to send his three sons to be educated under Verbeck and to America. He received high office and salary, and in 1870, as envoy of the mikado to the recalcitrant Satsuma leaders, led in the movement to abolish feudalism, and was prominent in securing the formation of a new national army. As Minister of Foreign Affairs and Junior Premier, he was visited by his sovereign. He went to Europe and America as head of the great embassy of 1872. Upon his return he opposed strongly and with success war against Korea. He was a great admirer of political institutions in the United States and left a powerful impress on the nation and the sovereign, from whom he received the highest honors. He escaped numerous attempts to assassinate him, notably that carried out by nine assassins in 1873. Of his children, a son, Prince Iwakura Tomosada, of the House of Peers, became an important functionary at the Court of the Emperor, and the other, a daughter, became the head of the Red Cross work in Japan. See JAPAN.

IXION, ĭks-ī'ŏn, in Greek mythology, king of the Lapithæ in Thessaly, son of Phlegyas. He married Dia, daughter of Deioneus. He murdered his father-in-law, and as punishment, became insane until Zeus cured him and permitted him to reside in Olympus. He became enamored of Hera, and attempted to seduce her. Zeus made a cloud in the shape of Hera, and carried it to the place where Ixion had appointed to meet her. Ixion was caught in the snare, and from his embrace with the cloud were born the Centaurs (q.v.). Zeus banished him from heaven; struck him with his thunder, and ordered him tied to a winged or fiery wheel which was to revolve eternally, according to some in the air, and to others in the underworld.

IXTLILXOCHITL, Fernando de Alba, Mexican historian: b. Texcoco, 1570; d. there, 1649. He was descended, through his mother, from the ancient kings of Texcoco, and on the death of his eldest brother in 1602 he was declared by royal decree heir to the titles and possessions of his family. The property, however, does not appear to have been large, as he complained in 1608 of the deplorable state of misery to which the posterity of the kings of Texcoco were reduced. At this time he was employed as interpreter by the viceroy, which appointment he owed to his learning and skill in explaining the hieroglyphic pictures of the ancient Mexicans. He had also a profound knowledge of the traditions of his ancestors which were preserved in the national songs, and was intimate with several old Indians famous for their knowledge of Mexican history. He turned his own labors and those of his friends to account in composing works on the history of his country. They remained unknown until their importance was revealed by Clavigero, and afterward by Humboldt. The former says they were written in Spanish by command of the viceroy, and were deposited in the library of the Jesuits in Mexico. There were copies also in other libraries. The history was divided into 13 books or relations, many

of which were repetitions of the former relations, and covered the period from the most ancient times to the destruction of the Mexican Empire. The 13th book was printed under the title, 'Horribles crueldades de los conquistadores de Mexico y de los Indios, que los ayudaron en subyugar aquel imperio á la corona de España' (Mexico 1829; French translation by H. Ternaux-Compans, Paris 1838). Afterward Ternaux-Compans, having obtained a complete copy of the whole 13 books from Madrid, translated them into French under the title, 'Histoire des Chichimecas et des anciens rois de Tezcoco' (2 vols., Paris 1840). An edition by Alfredo Chavero was published at the expense of the Mexican government (2 vols., Mexico, 1891–92). The 'Antiquities of Mexico,' by Viscount Kingsborough (9 vols., London 1840) contains the Spanish text of the 'Historia' and the 'Relaciones' of Ixtlilxochitl.

IYAR, the eighth month of the Jewish civil year, and the second month of the sacred year, corresponding, at the earliest, with April; but it may be as late as June; it has always only 29 days. Consult Burnaby, S. B., 'Elements of the Jewish Calendar'

IYEYASU, Tokugawa, Japanese general and statesman: b. Okasaki, Mikawa, 1542; d. 1616. He served as a soldier under Nobunaga and Hideyoshi, and gradually rose to distinction. Obtaining land in Mikawa and the neighboring province of Suruga, he built the strong castle of Shidzuoka, a town still intimately associated with his family and dynasty. When Hideyoshi died in 1598, Iyeyasu promised to look after the interests of his son, Hideyori, a boy of six. But the child, as the son of an upstart, could not keep together the large following to which his father's abilities alone had given cohesion. Hidenolu, nephew of Nobunaga, a professed adherent of Christianity, represented a third party. The great battle of Sekigahara, fought near Lake Biwa, 15 Oct. 1600, finally decided matters and made Iyeyasu master of Japan. He had been establishing himself at Yedo, which he now made the centre of his rule. From this city he pacified Japan, adopting in his foreign relations that isolating policy which made it a hermit country for the next two and a half centuries. He founded the magnificent dynasty of the Tokugawas, which ruled Japan vigorously until 1868, always, however, acknowledging fealty to the ancient imperial house at Kioto. In 1616 Iyeyasu died, having given "peace" to his country. He was buried at Nikko, one of the noblest mausoleums in the world; and was deified under the posthumous title of Gongen-Sama. An interesting historical document bearing the title 'Testimony' or 'Legacy of Iyeyasu' was written by him. The usual name by which it is referred to is 'Hyakkajo,' or Hundred Articles. Consult Griffis, W. E., 'The Mikado's Empire.'

IZABAL, Guatemala, capital of the department of the same name, situated on the Golfo Dulce, or Lake Izabal. The Rio Dulce connects it with the Caribbean Sea, but is navigable to Izabal for small craft only. Izabal has a large export trade in ebony, rosewood, coffee, cacao, sarsaparilla, etc., through Livingston, a port on the Caribbean, at the embouchure of the Dulce. Pop. 4,000.

IZARD, George, American general: b. Richmond, Surrey, England, 21 Oct. 1776; d. Little Rock, Ark., 25 Jan. 1828. He was a son of Ralph Izard (q.v.). He was graduated from the College of Pennsylvania in 1792, and after a tour in Europe, and study in private military schools in England, Germany and France, he was appointed in 1794 a lieutenant in the regiment of artillerists and engineers in the United States army. He did not return to the United States until 1797, then held various commands, but resigned in 1803. Upon the breaking out of the War of 1812 with Great Britain he served as colonel of the 2d artillery, and was successively promoted to be brigadier general in 1813 and major-general in 1814. At one period of the war he held chief command of the northwest frontier. In defense of his actions in this command, attacked by anonymously published pamphlets, he published 'Official Correspondence with the Department of War Relative to the Military Operations of the American Army under the Command of Major General Izard on the Northern Frontier of the United States, 1814–15' (Philadelphia 1816). In 1825 he became governor of Arkansas Territory, in which office he died. Consult Manigault, G. E., 'The Military Career of General George Izard' (in *Magazine of American History,* Vol. XIX, p. 462, New York 1888).

IZARD, Ralph, American statesman: b. near Charleston, S. C., 1742; d. South Bay, near Charleston, 30 May 1804. He was educated at Christ's College, Cambridge, England, and, inheriting an ample fortune, established himself in 1771 with his family in London, whence the troubled condition of American politics induced him in 1774 to retire to the Continent where he traveled extensively. He subsequently endeavored to impress upon the British ministry the ill-advised nature of the course they were pursuing, but without effect. Although appointed in 1776 by the Continental Congress, United States Commissioner at the court of the grand duke of Tuscany, he continued to reside in Paris and played a prominent part in the differences existing between the American commissioners in France. In 1780 he returned to the United States, and found occasion to serve the country in various ways, having been instrumental in procuring the appointment of General Greene to the command of the southern army, and having once pledged his whole estate as security for funds needed in the purchase of ships of war in Europe. In 1782 he entered the Continental Congress, of which he remained a member until the peace; and upon the adoption of the Federal constitution he was elected a United States Senator from South Carolina, serving until 1795. As a legislator he was able, but not particularly eloquent and in the Senate possessed the confidence of all parties. The 'Correspondence of Ralph Izard from 1774 to 1804, with a Short Memoir,' was published by his daughter (New York 1844). He also wrote 'An Account of a Journey to Niagara, Montreal and Quebec in 1765' (New York 1846). Consult Manigault, G. E., 'Ralph Izard, the South Carolina Statesman' (in *Magazine of American History,* Vol. XXIII, p. 60, New York 1890).

IZARD, the chamois (q.v.); so called in the Pyrenees.

J

J THE tenth letter of the English alphabet, was unknown to the ancient Latins and Greeks as an alphabetic character and representative of a vocal sound.

Till the 16th century the Latin and other alphabets of western Europe had only the letter *i* to represent both the vowel sound *i* and the consonant sound now represented by *j*: at least in fonts of type of that century, and till the end of that century or later, the character *i* served to represent both the vowel and the consonant, though a distinction was made between them in manuscripts of the previous century by continuing the stroke of the *i* a little below the line when it stood for the consonant. This letter *j* from the first represented in English the sound of *dzh*, in French that of *zh*; in German and other languages its value is that of the consonant *y*; for example, Julius, pronounced yulius, jacio, pronounced yacio.

For speakers of the modern European languages the *j* in Latin has usually the same value as in their native tongues. But though for Spaniards *j* in Latin is equal to *y*, in their own speech *j* is a strong guttural aspirate that might be represented in English by *kh*. The sound of *j* in English is always represented in Italian by *g*, invariably followed by *e* or *i*; the French and English journal is in Italian *giornale*, the Latin *judex*. English judge is in Italian *giudice*.

The sound of dzh is represented in English not only by its proper letter *j*, but also by *g* and by *dg*: jest, gem, edge. In the word "hallelujah" the *j* retains its early consonantal value of *i* or *y*.

JABALPUR, India, chief town of the district and division of the same name, in the central provinces, 1,458 feet above sea-level, 165 miles northeast of Nagpur. It is in a rocky basin, the gorges about which have been converted into artificial lakes of great beauty. It is a modern, growing city, and a station on the railway between Bombay and Allahabad. It has law, engineering and industrial schools and manufactories of carpets, cottons, statuary, brass, wire screens, etc. Pop. 100,650.

JABBOK, yăb'bok, a river east of the river Jordan. After running 18 miles south, it runs nearly due west and empties into the Jordan River midway between the Sea of Galilee and the Dead Sea. It was a boundary line between the ancient kingdoms of the Amorites and the land of Bashan. It was also a boundary between the Jewish tribe of Reuben and the half tribe of Manasseh. In the time of Origen, he says it was known as the Jambice. The night struggle of Jacob with his visitor occurred on the south bank of the river. From the bluish color of the water, it is now called Wady Zerka.

JABESH-GILEAD, the chief city of the land of Gilead lying within the limits of the half-tribe of Manasseh. There are ruins in the Wady Yabis which may be those of the ancient city. The place is mentioned several times in the Old Testament. It was captured and destroyed by the Israelites and 400 of its virgins taken as wives by the Benjamites. Later the city was attacked by Nahash, leader of the Amorites. The city appealed to Saul, king of Israel for succor, he came to their rescue and routed the Amorites. They never forgot this service and after the fatal battle of Mount Gilboa the citizens of Jabesh-Gilead recovered the bodies of Saul and his sons and gave them burial with honors. David commended the men of Jabesh-Gilead. Later the bones of Saul and his sons were buried in the territory of Benjamin.

JABIRU, jab'i-roo, a large species of stork (*Mycteria americana*), somewhat resembling the adjutant, found nearly throughout South America and northward into Mexico and Texas. It is about five feet high, with stilt-like legs, and massive, slightly upcurved beak; the plumage is white and the naked head and neck black. In habits it resembles the other storks (q.v.). Several related Oriental species have received the same name.

JABORANDI, a Brazilian shrub (*Pilocarpus pennatifolius*) of the order *Rutaceæ*, which yields a volatile oil from which is derived a principle (pilocarpin) in the form of an amorphous white powder having properties similar to atropine. It is the basis of the drug jaborandi, which is diaphoretic and sialagogic in its effects. Other "jaborandis" are obtained from species of *Serronia, Aubletia* and *Piper*.

JACAMARS, a group of small, gaudy, South American birds of the family *Galbulidae*, and related to the puff-birds and woodpeckers. Their plumage is highly colored, reds and bronzy greens and blues predominating. They live mostly along the outskirts of forests, and feed upon large insects caught in flight. White eggs are laid in holes in earthen banks; and a whistling song is given during the breeding season.

JAÇANAS, zhā-sā'nā or jă-kā'na, a group of birds (*Parridæ*) related to the rails, and remarkable for the extraordinary length of the toes, which are further extended, especially the hallux, by long, slender claws. There are four genera and about a dozen species, most of which inhabit the Old World — Africa, India, and Australia. The genus *Parra* is American, and one Mexican species (*Parra spinosa*) enters Texas. The beak is plover-like and the bend of the wing bears a stout and acute

horny spur; the plumage is of a rich purplish brown with the wings green and black. The great spread of the toes enable these birds to walk with ease on the floating leaves of water-lilies and similar plants, otherwise their habits are much like those of rails (q.v.).

JACARANDA, a genus of tropical American trees of the Bignonia (q.v.) family. One (*B. brasiliana*) yields the wood called jacaranda wood, or blue ebony, which is very hard and capable of receiving a fine polish. The name is carelessly applied to several other South American woods used in cabinet-work.

JACARÉ, zhä-kä-rā′ or jäk′ą-rĕ, a South American name for an alligator of the genus *Caiman,* of which the large black species (*C. niger*) reaches a length of 20 feet and is called on the upper Amazon jacaré-nassu, while the jacaré-tinga (*C. trigonatus*) is only six feet long, and has a slender muzzle and black-banded tail. See CAYMAN.

JACCOUD, zhaa'koo', **François Sigismond,** French physician: b. Geneva, 20 Nov. 1830; d. 27 April 1913. He was educated in Geneva and Paris; became professor of pathology at Paris in 1877, and professor of clinical medicine there in 1883. In 1877 he was elected member of the Academy of Medicine. He wrote numerous works, the most important of which are 'De l'organisation des facultés de médicine en Allemagne' (1864); 'Leçons de clinique médicale' (1867–88); 'Traité de pathologie interne' (7th ed., 1883); 'Du froid comme cause de pneumonie' (1887). He was editor of 'Nouveau dictionnaire de médicine et de chirurgie' (1864–86).

JACK, a pike; in the United States, the common eastern pickerel (q.v.) is most usually meant. The wall-eyed pike (q.v.) is called "jack salmon" in some parts of the West. Several marine fishes are known as jack fish, amber jacks, etc., especially among the lively sea-bass, groupers, amber-fish and the like. The term, as in other cases, implies a quality in the animal exciting friendly interest and admiration.

JACK, an apparatus for raising heavy bodies and for moving machinery. The moving parts consist sometimes of a simple screw moving within a nut fixed in the shell of the instrument, and turned by a long handle or a system of gearing; sometimes of a hydraulic press of compact form, small size and high power; and occasionally of combinations of levers and gearing. The first of these forms of the tool is variously called a jack-screw, or screw-jack; the second is usually termed an hydraulic jack; the last a geared jack. The screw-jack is most commonly used for moderate weights, as a few hundred pounds, or perhaps a ton; the others are used up to 10 or 20 tons, or even more, but finally merge into the hydraulic press, as they lose portability, which is an essential characteristic of the jack. The machine is always compact, as light as is consistent with proper strength and safety in operation, simple in design, and of the best material and workmanship, to insure the desired combination of strength and lightness. Its exterior is commonly a plain cylinder, mounted upon a properly formed foot and having concentric with it another cylinder, moving snugly within or outside it. The introduction of the automobile has made everybody familiar with a compact type of gear-jack for raising the body when adjusting or fitting tires, etc.

JACK, JACA, or **JACK-TREE** (native name *Jaca*), a tree (*Artocarpus integrifolia*), related to the bread-fruit (q.v.), a native of the East Indian archipelago and southeastern Asia, often planted for ornament and for its fruit which grows to a larger size than the bread-fruit of the Southern Pacific islands. Specimens often weigh more than 30 pounds, and contain from 200 to 300 seeds, each of them four times as large as an almond. The seeds or nuts are eaten after being roasted or boiled, and the sweet fleshy pulp of the fruit is also eaten by coolies and natives but is less palatable than bread fruit. When the tree is young the fruit grows from the twigs; in middle age it grows from the trunk; and when the tree gets old, from the roots. It forms a great part of the food of the natives in some portions of India, Ceylon, etc. The yellowish timber is used for almost any purpose, being strong and ornamental. It yields a yellow dye. To succeed in growing the tree, hot moist atmosphere, ample water but perfect drainage are essential.

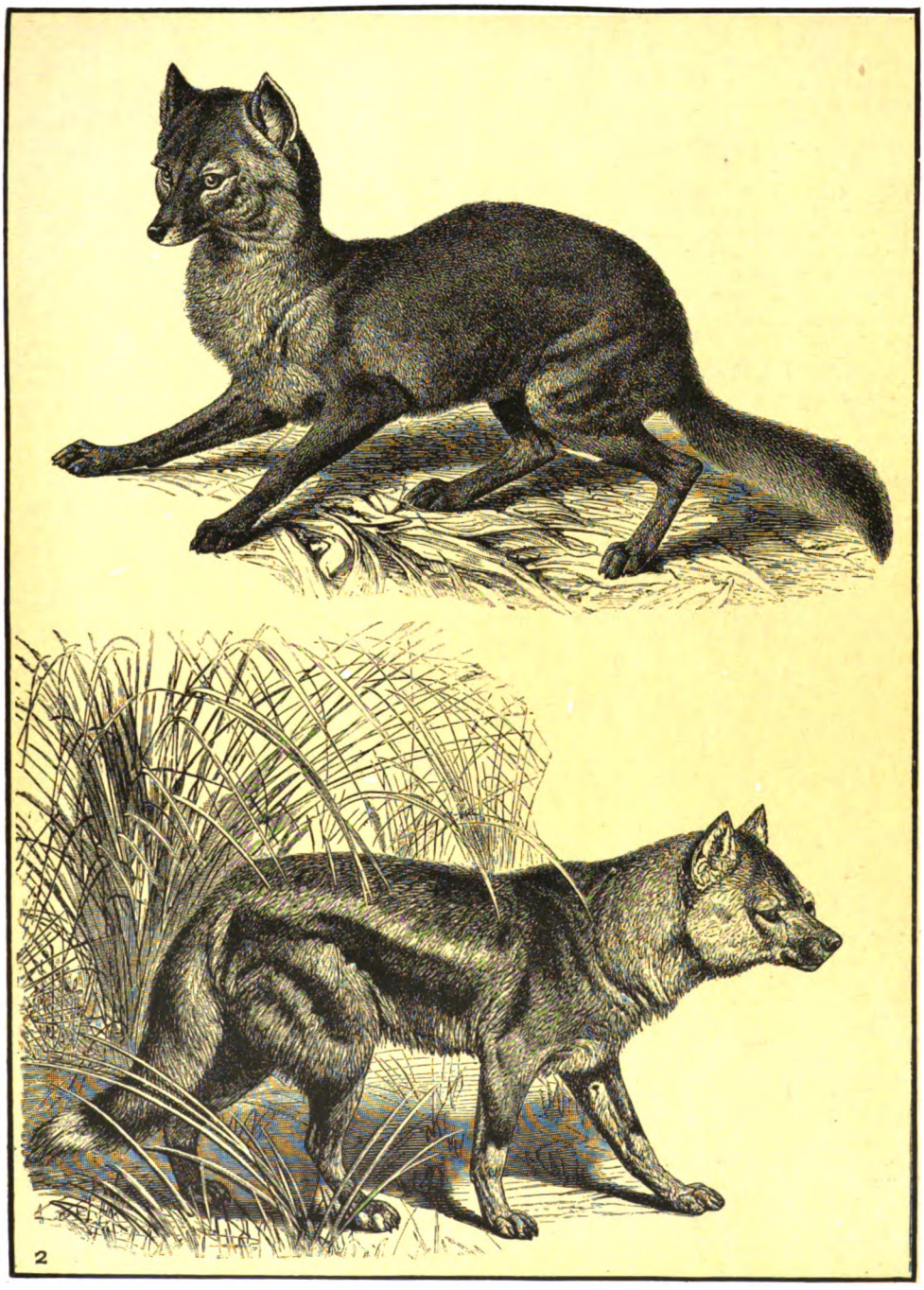
JACK AND THE BEANSTALK, an English nursery tale relating to the heroism of a boy. Its analogue occurs in many national folk-lore legends. It is supposed to represent in a figure the restoration to the earth of those fertilizing and elemental activities, which are necessary to human life. The harp is the wind, which drives the ships and turns the mills to grind the wheat. The bags of treasure are the rain-drops that scatter wealth and plenty. The red hen is the sun that brings life to birth by its fostering heat.

JACK THE GIANT KILLER, the hero of an English nursery story, which reflects triumph of skill over strength and bulk such as makes the point of the story in David and Goliath, Ulysses and Polyphemus, etc. The English form is based upon the legend that Saint Michael's Mount, in Cornwall, was once the fortress or castle of a giant, who was dislodged by the valor of an English knight. In adapting the story so as to claim the sympathies of children the knight is made to take the shape of a child.

JACK HORNER, the first words of an old nursery rhyme. The rhyme is said to be based on a historic fact. Horner was the messenger whom the abbot of Glastonbury sent to Henry VIII with the deeds of certain manors involved in the dissolution of monasteries. Horner obsequiously handed the parcel to the royal spoliator, but first of all managed to abstract the deeds of the manor of Wells, a "plum" indeed, and the abbot was afterward punished on the charge that he had withheld them.

JACK AND JILL, the first words of an old nursery rhyme, of considerable folk-lore interest. Jill is a corruption of the French Julienne, once common in England under the form Gillian. It also appears in the legend of Saint Kilian, where Geilana vindictively causes the good bishop's death. This incident of Jack and Jill is probably based on one of the moon

JACKALS



1 Common Jackal

2 Side-striped Jackal

myths of Scandinavia. The Norse peasant sees in the spots on the moon the two children rescued by the moon from their father, who had forced them to draw water all the day.

JACK-IN-THE-PULPIT, or INDIAN TURNIP, a perennial herb (*Arisæma triphyllum*) of the arum family (see *Araceæ*), so called from its spadix, which is upright, with the spathe surrounding and arching over it, suggesting a preacher in an old-fashioned pulpit with a sounding-board. It is common in the United States, east of the great plains, in damp, shady woods and is easily grown in moist garden soil. The spathe falls away in early summer. By late summer the berries which form a dense ovoid head become a brilliant, waxy scarlet. Its acrid tuber or corm is valued for its medicinal properties.

JACK-SNIPE, a gunner's term for a shore-bird, also called grass or meadow snipe, which is in reality a sandpiper, named in books the pectoral sandpiper (*Tringa maculata*). The perversion of names is due to its somewhat game-like habits of lying to a dog and flushing correctly from the grass, like a true snipe which render it an attractive object of pursuit; beside which, in the fall it becomes very fat, and it is then excellent eating. Unlike most sandpipers, it does not flock, at least to any extent, being oftenest found scattered singly or in pairs. In the United States it is chiefly, if not wholly, a bird of passage, breeding in Canada and wintering in the tropics. It is nine inches long, clay-colored, striped with blackish above; breast ashy and sharply streaked; belly white. Consult authorities mentioned under shore-birds.

The English "jack-snipe" is a true snipe (*Gallinago gallinula*) of very small size, and therefore also known as "half-snipe."

JACKAL, a small active wild dog or wolf of the warmer regions of the Old World, found in southeast Europe, Africa, Syria and southern Asia. The common jackal averages about 2 or 2½ feet in length and about 14 inches in height, with a bushy tail about 8 inches long. The eyes are small and the pupil is round. The general color of the body is a dirty yellow or brown, lighter on the throat and belly. Jackals inhabit holes and burrows whence they come forth in the evening to hunt in packs. Their cry consists of a series of prolonged howls, followed by shorter yelps, much like that of the American coyote. The jackal subsists largely upon carrion, often that left after the repast of the fiercer and larger carnivora; but it also kills prey for itself, a pack hunting down antelopes, deer or other animals, besides getting much small fare, as mice, lizards, insects and the like. They also eat certain kinds of vegetable food, and sometimes they do considerable damage to sugar and other plantations. The jackal is susceptible of being tamed, but its odor makes it by no means a desirable domestic animal. It is believed to be exceedingly cunning, and in many Eastern tales, especially among the people of India, plays exactly the same part as the fox does in those of Europe. It is probable that jackals have contributed frequently to the commingled stock represented in our domestic dogs, some of which betray very jackal-like points. They inter-breed with domestic races.

The common jackal (*Canis aureus*) is the most widely distributed species; but another species, found mostly in eastern southern Africa, is the blackbacked jackal (*C. mesomelas*). This latter form has the back and end of the tail black, the other parts mostly red or yellowish-red. A third species of jackal found in South Africa is the canduc (*C. adustus*), marked by a light stripe on the sides. Consult Mivart, 'Dogs, Jackals, Wolves and Foxes' (London 1890).

JACKASS KINGFISHER, or LAUGHING JACKASS, the name of a large inland kingfisher (*Dacelogigas*) of Australia, given by the colonists in allusion to its loud, hoarse cry. It is about 17 inches long, brown in general color, does not frequent water or catch fish, but lives on insects, small reptiles, etc., and lays its eggs in a hole in a tree.

JACKDAW, a small, black European crow (*Corvus monedula*), with black legs and feet and grayish neck. They inhabit towers, spires and like elevated situations, and even in towns and populous cities are present and breed freely. The nests and eggs are like those of other crows (q.v.) which they resemble in general habits. Jackdaws are easily tamed, learn to pronounce many human words, and are most amusing pets, but are mischievous and thieving, like magpies.

JACKRABBIT. See HARES.

JACKS, Lawrence Pearsall, English educator and editor: b. Nottingham 1860. He was educated at University School, Nottingham, University of London, Manchester College, Oxford, Göttingen University and Harvard University. He entered the ministry as assistant to Stopford A. Brooke in Bedford chapel, London. Later he held parishes in Liverpool and Birmingham. Since 1903 he has been professor of philosophy in Manchester College, Oxford, and dean of the college and warden of residence. He has been editor of the *Hibbert Journal* ever since it was founded in 1902. He is the author of 'Mad Shepherds and other Human Studies' (1910); 'Alchemy of Thought' (1911); 'Among the Idol-Makers' (1912); 'All Men are Ghosts' (1913); 'From the Human End: A Collection of Essays' (1916); 'Philosophers in Trouble; a volume of stories' (1916); 'Life and Letters of Stopford Brooke' (his father-in-law, 2 vols., 1917); 'Country Air' (1917).

JACKSON, Abraham Valentine Williams, American Indo-Iranian scholar: b. New York, 9 Feb. 1862. Graduated from Columbia in 1883, he was Fellow in letters there (1883–86), instructor in Anglo-Saxon and the Iranian languages (1887–90), and, after study at Halle (1887–89), adjunct professor of English language and literature (1891–95). In 1895 he was appointed professor of Indo-Iranian languages and public lecturer at Columbia. By way of recognition of the instruction given by him in their ancient books, the Parsees made to the Columbia library the gift of an important manuscript collection of Zoroastrian works. He appeared also as a public lecturer, became one of the directors of the American Oriental Society, and in addition to numerous contributions to the *Journal* of that society and other learned periodicals, wrote 'A Hymn of Zoroaster, Yasna XXXI' (1888); 'An Avestan Gram-

mar' (1892); 'An Avestan Reader' (1893); 'Zoroaster, the Prophet of Ancient Iran' (1899). He traveled for research in India in 1901 and 1911, receiving special attention from the Parsis community in India; and also traveled in Persia and central Asia in 1903, 1907 and 1910. He wrote 'Persia, Past and Present' (1906); 'From Constantinople to the Home of Omar Khayyam' (1911), and with A. Yohannan the 'Descriptive Catalogue of the Persian MSS. in the Metropolitan Museum of Art' (1913). He edited the 'Columbia University Indo-Iranian Series' (5 vols., 1902), and 'A History of India' (9 vols., 1906–15).

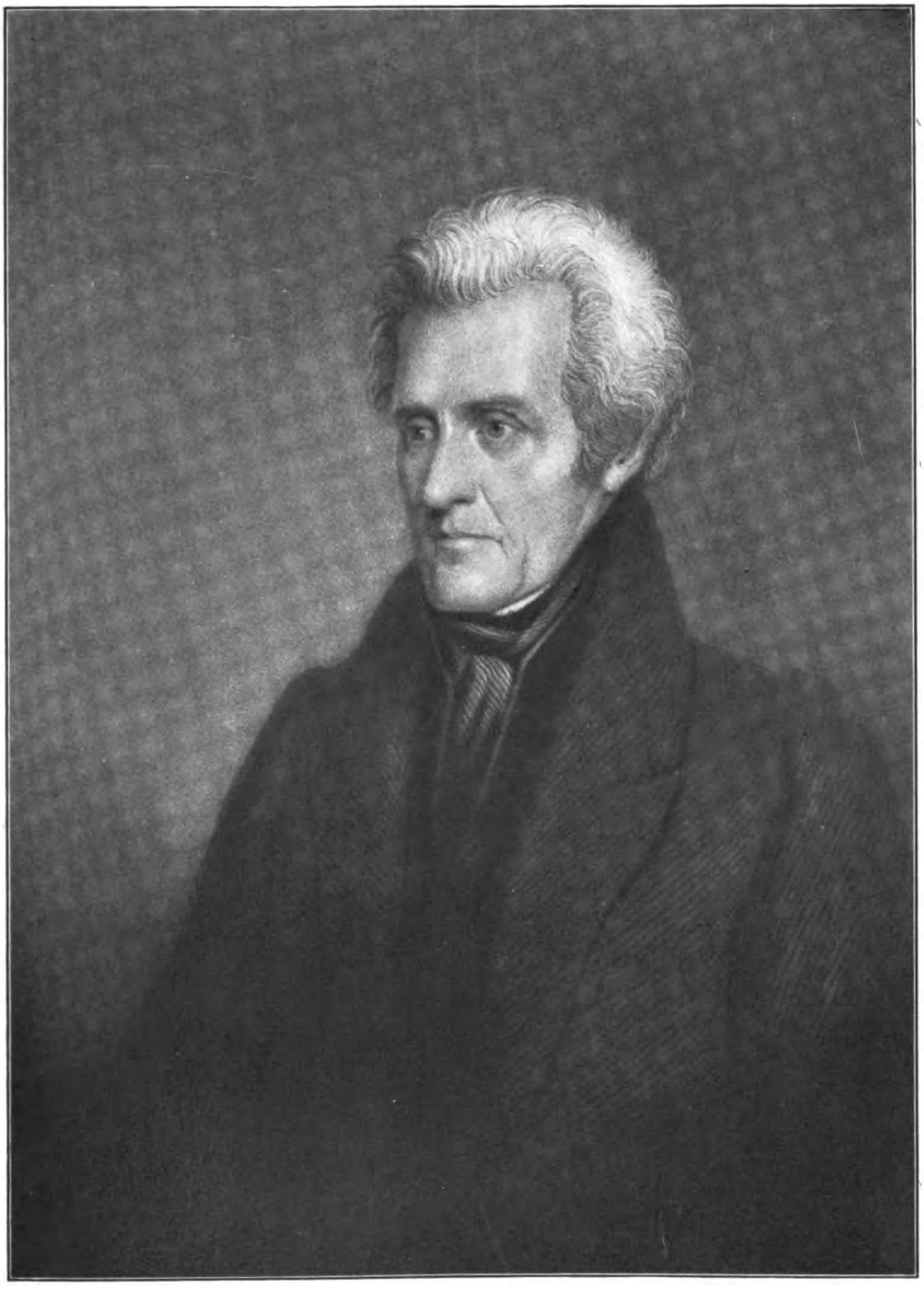
JACKSON, Andrew, seventh President of the United States: b. in the Waxhaw settlement near the border line between North and South Carolina, 15 March 1767; d. at his home, "The Hermitage," near Nashville, Tenn., 8 June 1845. It is a matter of dispute to which of these States the honor of his birth belongs, but the evidence is in favor of South Carolina. Andrew Jackson, his father, emigrated from Carrickfergus, County Antrim, in the north of Ireland, in 1765, and died a few days before the birth of his famous son. The early environment of the future President was extremely unpropitious. He lived in a rough frontier region, with little opportunity for education or other form of culture. In fact, Jackson received very little "schooling," and was never able to write correct English. Little is known of his early life beyond the fact that he was a headstrong, pugnacious boy. During the Revolutionary War the Waxhaw district was invaded by the British who took Jackson prisoner, then a boy of 13, illtreated him and carried him to Camden for imprisonment. His two brothers lost their lives in the war and his mother died as a result of hardships incurred on a journey to Charleston to help care for prisoners there. These early incidents account for his antipathy toward England, and doubtless stimulated him at the battle of New Orleans, where he evened up old scores.

At the age of 17 he entered a law office at Salisbury, N. C. Traditions exist of what would now be considered a wild life, and it is likely that they are true, for frontier societies, such as he lived in, took delight in gambling, horse-racing, cock fighting, dueling and similar pastimes. Jackson was admitted to the bar in November 1787. In the spring of 1788 he started for Tennessee, and in the fall established himself at Nashville as a practising lawyer. In 1789 he was given the solicitorship, with a salary of 40 pounds, for a Superior Court district comprising three counties in Tennessee. The region where Jackson was to take up his duties as public prosecutor was wilder than the Waxhaw Settlement. It was a real frontier filled with persons who were individualists, who believed in the personality of law, and who were unwilling to submit to any form of restraint. Here was the home of quarrels and feuds, a harvest for the young lawyer, but he must needs be a brave man, better versed in human nature than in precise knowledge of the law, to succeed in such an environment. Jackson had exactly these characteristics, with others, which made him the ideal man for such a position. Himself a product of the frontier, and chafing under the restraint of law, yet he instinctively was somewhat of a despot, a master of men, and quite as determined to make others obey the law, as he himself was often determined to break it. Jackson's main business from 1789 was to introduce law and order into a community that did not care for it. He found plenty to do, and it is on record that in the April term, 1790, out of 192 cases on the docket of the County Court at Nashville, Jackson was employed as counsel in 42 of them; in the year 1794, out of 397 cases he acted as counsel in 228. Besides devoting his energies to putting down lawlessness among the whites, he found time to look after the Indians, who committed numerous murders in the district in this period. He thus acquired a taste for Indian fighting, which greatly influenced his subsequent career.

He married a Rachael Robards in Natchez, Miss., in the summer of 1791, believing that the legislature of Virginia had granted her husband a divorce, instead of, as was the case, a mere permission to bring suit for divorce. The suit was not brought until 1793 and the divorce was granted, because technically Robards' wife was unlawfully living with Jackson as his wife. Jackson immediately procured another license and had another ceremony performed in 1794. There is no good evidence that Jackson's wife was unfaithful, or that Jackson was not acting in good faith and in the honest belief that a divorce had been granted. Nevertheless, as a lawyer, he should have known that the Virginia legislature did not grant divorces at this time, but only gave permission for a suit to be brought in the proper court. The incident was used mercilessly by the partisan press in the campaign of 1828, but it is evident that those who knew Jackson believed in his honesty.

Jackson was a member of the convention which drafted the first constitution of Tennessee, and in 1796 was chosen representative in Congress from this State. The next summer, 1797, he was chosen senator to fill a vacancy, but resigned in 1798 to become a judge of the Supreme Court of Tennessee, a position which he held until 1804. While in Congress he did not distinguish himself particularly, but showed even so early his opposition to the United States Bank and to federalist doctrines. Little is known of his work as a judge of the Supreme Court, since few decisions were recorded, and not one of them was Jackson's. It is generally agreed that his knowledge of the law was extremely meagre and that he decided cases on the principles of common sense, modified, however, by his own personal feelings and prejudices.

From 1804 to 1811 he was engaged as a planter, trader and merchant. He ran a general country store in partnership with others. As a trader he was successful, but as a retail merchant he was nearly a failure, and was glad to sell out at almost a total loss. This was the period of one of his famous duels, that with Charles Dickinson, and of numerous quarrels. Though without previous military experience to speak of, he was elected major-general of militia for the western district of Tennessee in 1802. When war was declared against England in 1812, Jackson offered his services with 2,500 volunteers, and in the autumn was ordered



ANDREW JACKSON

Seventh President of the United States

to proceed to New Orleans. In March 1813 he was at Natchez, Miss., when orders came from the Secretary of War to dismiss his troops. He refused and marched them back home 500 miles on his own responsibility and partly at his own expense, though later he was reimbursed by the government. In the fall of 1813 and spring of 1814 he was engaged in an expedition against the Creek Indians, who had massacred the garrison and refugees at Fort Mims, Ala., 30 Aug. 1813. He finally overwhelmed them at Tohopeka or Horseshoe Bend, Ala., 27 March 1814. This Indian war was outside the Federal operations and was carried on by the States of Tennessee, Georgia, Louisiana and Mississippi, but it had an important bearing on the whole campaign. For with the destruction of the Indian power in this region there could be a concentration of military power at any point where it was needed in the Southwest, and this really made possible the victory at New Orleans.

On 31 May 1814, Jackson was appointed major-general in the Regular Army and given command of the Department of the South. His headquarters were established at Mobile, then in dispute between Spain and the United States. On 6 November, without waiting for orders from Washington, he attacked the English, who had occupied Pensacola, apparently without objections from Spain, and drove them out of Florida. This left him free for the defense of New Orleans, where he arrived 2 Dec. 1814. He declared martial law, impressed soldiers and sailors, and inspired his army of about 6,000 men with his own courage and determination to resist attack at any cost. The English had about 12,000 veteran troops under General Pakenham. In the main attack 8 Jan. 1815 he defeated the British, who lost over 2,000 in killed, wounded and captured, while Jackson lost the astonishingly small number of only seven killed and six wounded. This victory, won when there was great discouragement over the progress of the war, made him a national military hero, and paved the way for his political career. Although the battle occurred after peace had been concluded, this did not affect Jackson's popularity. He became especially popular in the West, for this section felt that he had ended for all time the danger of the control of the Mississippi Valley by a foreign power.

Florida next demanded Jackson's attention. There was great disorder in this Spanish territory because the coasts were a haunt for privateers and filibusters. It was believed that the Indians got aid and encouragement from the Spanish and that British agents were stirring them up to wage a frontier war on the United States. Massacres of whites occurred and Spain took no vigorous measures to preserve order. In December 1817 Jackson was ordered to the Florida frontier to prepare for a possible invasion of the territory. Without waiting for direct orders, but understanding from the letter of a friend in Congress that President Monroe had approved his plan for the conquest of Florida, Jackson, who had raised troops in Tennessee and neighboring States, advanced through Georgia. He captured Saint Marks, Florida, in March 1818, and within three months had overthrown the Seminole Indians, arrested two British subjects, Arbuthnot and Ambrister, had them tried by court martial for inciting the Indians to war and for spying, and, on insufficient evidence, had them executed. This raised delicate diplomatic questions and led to a proposal by Calhoun, then Secretary of War, that Jackson should be censured for his conduct. When Jackson found this out, during his first term as President, he vowed vengeance on Calhoun, and this incident was one of the causes of the break between the two men and the ousting of Calhoun's friends from the Cabinet.

After the acquisition of Florida by purchase in 1819, Jackson was appointed its territorial governor (1821). According to the testimony of Parton, his biographer, he governed badly and his conduct while governor was "arrogant and disgraceful." On 20 July 1822, the legislature of Tennessee nominated him for President. In 1823 he was chosen senator from Tennessee for the second time. In the election of 1824–25 Jackson received 99 of the electoral votes to 84 for John Quincy Adams, 41 for Henry Clay and 37 for William H. Crawford. No candidate receiving a majority, the election was thrown into the House of Representatives, with the result, due to Clay's support of Adams, that Jackson was defeated. When Clay was immediately appointed Secretary of State, the cry of "corrupt bargain" was raised, though there is no evidence that Adams promised this office in return for Clay's support. Nevertheless Jackson believed the story, and his political managers made as much capital as possible out of it in the next campaign for the presidency, which in fact started at once. It was also maintained that Jackson had been cheated out of the presidency because he had the largest number of electoral votes, and hence should have been chosen President by the House of Representatives rather than Adams. This, however, was another party war cry to gain votes for Jackson.

The election of 1828 was a great victory for Jackson, as he received 178 electoral votes to 83 for Adams. The result was a great surprise to many, especially to the conservative North Atlantic States. While many voted for Jackson for personal reasons, because he was a military hero or because of a belief that he was unjustly deprived of the presidency in 1824–25, and others as a protest against alleged misgovernment by Adams, or personal antagonism to him, yet the real causes of Jackson's extraordinary success lie deeper. His election was the result of a protest against what many considered too much centralization of power in the national government, and a tendency to interpret the Constitution too broadly. This was shown in decisions of the Supreme Court in several well-known and important cases, as well as in acts of Congress providing for internal improvements at national expense, chartering the Second United States Bank, upholding the principle of a high protective tariff and refusing to distribute the public lands in a manner satisfactory to the West. These measures were looked upon as on the whole favoring the interests and power of the manufacturing, commercial and financial classes of the Northeast rather than the great agricultural classes of the South and West who composed

the mass of the people. This combination of the South and West to gain their special interests, a low tariff for the South and cheap lands for the West, was the greatest force in the election of Jackson.

The election also turned on the question of what type of man should administer the government and make the laws. The Federalist, Jeffersonian-Republican and National-Republican parties had never represented the great mass of the people, and this largely because of the belief that the government should be run by carefully selected educated leaders. Jackson represented the great new West and its democracy. The notion, "He is one of us" appealed very strongly to common men, and the election of Jackson was the answer to the question whether a class could be safely entrusted with the power to act wisely for the whole people. Jackson's real views on some of the important public questions were unknown, such as his attitude on the tariff, internal improvements, public lands and National vs. State rights. On the other hand, he was known to favor slavery, the removal of the Indians from lands coveted by the white man, the interests of the common people, and hence to be opposed to all forms of special privilege, monopolies and the centring of power in the hands of a favored class. It was thought probable also that he would favor a lower tariff and laws pleasing to the West on the question of the distribution of the public lands, since he was a western man. It was known also that Jackson was a master of men, almost despotic by nature, in spite of his humble origin and his interest in the common man; that his military career had taught him the necessity of obedience to law, at least by those subject to his orders, and that he was not likely to allow his authority to be questioned as President, or in the enforcement of the law as he understood it.

These views help to explain the principal events and policies of Jackson's two administrations. His democracy, expressed by a phrase, "Let the people rule," accounts in part for his approval of the spoils system, whereby some 2,000 were removed from office in the first year of his administration to make room for his friends, "the people." His frontier life and experience developed the peculiar personal character of his administration, as shown by his "kitchen cabinet." Jackson's military and political successes were due largely to his ability to inspire the fealty of those associated with him. Like the leaders of primitive societies, he depended on the unswerving loyalty of personal intimate friends. It was natural, then, that he should treat his regular cabinet officers as clerks, heads of departments, as was apparently intended by the Constitution, and that his real advisors should be those more intimate friends whom he knew well and could depend upon. His secretaries were chosen with this end in view, and they were in fact not much above the capacity of clerks. The principal members of his "kitchen cabinet" were William B. Lewis, his party manager; Duff Green, the editor of *The Telegraph* at Washington, a partisan newspaper; and Amos Kendall, a politician with brains, the chief advisor of Jackson on all important state questions. This personal character of his administration was also prominent in the relations of the executive to the legislative and judicial departments. Jackson greatly enlarged the importance and influence of the President in his contests with Congress and the Supreme Court.

His war on the United States Bank to prevent its securing a second charter was due primarily to his distrust of anything savoring of monopoly or special privilege. He gave notice in his first annual message of his doubts about the Bank, and vetoed the bill introduced by Clay for a new charter on 10 July 1832. This became the principal issue in the election of 1832 between Jackson and his opponent Clay. With his re-election by a large majority he was convinced that he had received a mandate from the people approving his attitude towards the Bank. In his second annual message he questioned its solvency, without warrant, and then made plans to destroy it. He ordered two successive Secretaries of the Treasury to remove the government deposits, and after both refused, appointed a third, Roger B. Taney, who, in September 1833, ordered government money to be deposited in sundry State banks, "pet banks," after 1 Oct. 1833. As money was withdrawn from the United States Bank to pay government expenses, its resources decreased. Jackson's avowed purpose was to prevent the Bank from buying up members of Congress in order to secure another charter. There followed the resolution of the Senate 28 March 1834, originally introduced by Clay, to censure Jackson on the ground that he had usurped powers not conferred upon him by the Constitution. Later, in 1837, Jackson had the satisfaction of having this resolution expunged from the records. Growing out of the activity of the State banks in making loans of public funds, and through the issuing of large quantities of paper money by other State banks, with little or no specie as a reserve, there arose a fever of speculation, especially in western lands which were paid for in paper money. Jackson called in a part of the government funds and issued his famous specie circular 11 July 1836, to the effect that only gold and silver would be received in payment for public lands. These incidents contributed largely to the panic of 1837.

Jackson reversed the policy of Adams in upholding the right of the Indians of Georgia to own lands, as guaranteed by treaties with the United States. He upheld Georgia in its refusal to obey decrees of the Supreme Court, and himself refused to execute them. He withdrew Federal troops from the Cherokee country, and allowed the State to assume jurisdiction over the Indian lands. This attitude was due partly to his hatred of the Indians, partly to the fact that he did not look upon the attitude of Georgia as one of defiance to the National government, but considered her as acting wholly within her rights. This was not understood thoroughly at the time, and misled the leaders of nullification in South Carolina, who supposed that Jackson had conclusively proved himself to be a states' rights man, and could be depended on to support their theories.

The first hint of trouble with Jackson in the nullification controversy came at a dinner in honor to Jefferson held at Washington 13 April 1830. Jackson proposed a toast in reply to several in favor of nullification, "Our Federal Union: it must be preserved," in contrast with one proposed by Calhoun, in effect, "Liberty

dearer than Union.» The question arose because of the opposition of South Carolina to the high tariff of 1828, «the tariff of abominations.» This was believed to be unconstitutional and peculiarly unjust to the South. A convention held 19 Nov. 1832, declared the tariffs of 1828 and 1832 null and void in South Carolina, to go into effect 1 Feb. 1833, and threatened secession if the federal government attempted to collect duties. Jackson ordered General Scott to Charleston, and sent two war vessels to the same port. He instructed the collector of the port to collect duties by force. He issued a proclamation 10 December telling the people of South Carolina that disunion by force was armed treason, and said, «I consider the power to annul a law of the United States, assumed by one State, incompatible with the existence of the Union, contradicted expressly by the letter of the Constitution, unauthorized by its spirit, inconsistent with every principle on which it was founded, and destructive of the great object for which it was formed.» This made Jackson almost as popular a civil as a military hero. The controversy ended in Jackson's favor, as the ordinance was never enforced, though the tariff was reduced by the Act of 1833.

Jackson's constitutional views as illustrated by his attitude on the Bank, Indian and nullification questions, are difficult to comprehend unless one thoroughly understands his view of the final source of authority in our governmental system, and the agency for executing it. According to Jackson, final power was the will of the people. A popular mandate was superior to acts of Congress or even to a decision of the Supreme Court. The President was the interpreter of just what the will of the people was, and must execute it independently of and without interference from Congress or the Supreme Court. The chief results of Jackson's two administrations were a reduction of the tariff, the preservation of national authority as against the states, a check on tendencies toward monopoly and privilege, the enhancing of the power of the executive, the introduction of the spoils system, the destruction of the United States Bank, encouragement of speculation and inflation, and the extension of a vicious banking system.

Jackson's character and policies affected people differently and opinions vary even to this day. His nature was so positive that his traits stand out boldly, whether good or bad. His was an untrained mind, but one of great natural power, and he would have made his mark in any society or environment. Lacking the discipline which comes from close association with trained minds and from study, he was incapable of weighing evidence and deciding questions on the basis of the facts. Rather he formed his opinions and made his decisions intuitively, or in accordance with his feelings. He made fewer mistakes than many men highly trained, because of his honesty of purpose, and his determination to carry out a policy once he had made up his mind. His ideas were original and grew out of his experience. They were seldom directly borrowed from other men, either the dead or the living. He was a typical son of the unadulterated frontier, and truly represented the mass mind of the frontier, and that meant at this period the greater portion of the American people. His most striking traits were those of the frontier — provincialism, self-confidence, energy, persistency, belligerency, insubordination, individualism, honesty, simplicity, ignorance of books, loyalty to friends, and hatred of enemies. He was the idol of the mass of the people — of the common man. To the more cultured portions of American society he was an uncouth, illiterate backwoodsman. Though Harvard University conferred on him the degree of doctor of laws, the comment of John Quincy Adams doubtless represented the attitude of many of the educated class towards Jackson. Adams said, «As myself an affectionate child of our *Alma Mater*, I would not be present to witness her disgrace in conferring her highest literary honors upon a barbarian who could not write a sentence of grammar and hardly could spell his own name.» The language is exaggerated, but the spirit of the remark was the sentiment of many, who could not divorce from their minds the notion that government must be administered only by trained, educated men.

Bibliography.— The latest and best biography of Jackson is that by John Spencer Bassett (2 vols., Garden City, New York 1911). The best single volume is that by William G. Sumner, (Boston 1882). Of the earlier biographies that by James Parton is still useful (3 vols., New York 1861). Other biographies are by W. G. Brown (Boston 1900); John H. Eaton (Philadelphia 1817); Amos Kendall (New York 1843). For important phases of Jackson's career as President consult Catterall, R. C. H., 'The Second Bank of the United States' (Chicago 1903); Boucher, Chauncey Samuel, 'The Nullification Controversy in South Carolina' (Chicago 1916). For extended bibliographies on all phases of Jackson's life, consult Edward Channing, Albert Bushnell Hart and Frederick Jackson Turner, 'Guide to the Study and Reading of American History' (pp. 412-420, Boston 1912).

MARCUS W. JERNEGAN,
Associate Professor of History, University of Chicago.

JACKSON, Benjamin Daydon, English botanist: b. London, 3 April 1846. He was educated in private schools, was secretary of the Linnean Society from 1880 to 1902, since when he has acted as general secretary. In 1900-01 he was secretary to the departmental committee of the Treasury on botanical work. His publications are 'Life of John Gerard' (1877); 'Life of Dr. William Turner' (1878); 'Guide to the Literature of Botany' (1881); 'Vegetable Technology' (1882); 'Pryor's Flora of Herts' (1887); 'Index Kewensis' (engaged nearly 14 years on its preparation, 1893-95); 'Supplement to Index Kewensis,' with Th. Durand (1901-06); 'Glossary of Botanic Terms' (1900; 3d ed., 1916); 'Life of George Bentham' (1906); editor of 'New Genera and Species of Cyperaceæ,' by late C. B. Clarke (1908); 'Darwiniana' (1910); 'Index to the Linnean Herbarium' (1912); 'Catalogue of Linnean Specimens of Zoology' (1913), and many shorter articles, chiefly on botany, botanic history and bibliography.

JACKSON, Charles, American jurist: b. Newburyport, Mass., 1775; d. 1855. In 1793 he was graduated at Harvard; entered on the

study of law in the office of Chief Justice Parsons. In 1796 he began the practice of his profession in his native Newburyport, remaining there for seven years, when he removed to Boston. In the latter city he became a partner of Judge Hubbard, and the firm was soon the most prosperous in Massachusetts. From 1813 to 1824 Mr. Jackson was justice of the Supreme Court of Massachusetts; served as delegate to the State Constitutional Convention of 1820, and in 1833 was appointed member of the commission charged with the revision of the State laws. Justice Jackson is the author of the important work, 'Treatise on the Pleadings and Practice in Real Actions' (1828).

JACKSON, Charles Loring, American chemist: b. Boston, Mass., 4 April 1847. He was graduated at Harvard in 1867, and subsequently studied at Heidelberg and Berlin. In 1868 he was appointed assistant in chemistry at Harvard, becoming full professor in 1881. He discovered a new method for the preparation of borneol from camphor in 1883–84. He retired in 1911. He published 'Lecture Notes in Chemistry' (1878) and numerous papers on organic chemistry in 'Proceedings of the American Academy' and in the *American Journal of Science.*

JACKSON, Charles Thomas, American scientist: b. Plymouth, Mass., 21 June 1805; d. Somerville, Mass., 28 Aug. 1880. He was graduated at Harvard Medical College in 1829. He assisted in a geological and mineralogical survey of Nova Scotia, publishing his results in 'Memoirs of the American Academy of Arts and Science.' He went to Europe in 1829, spending his time in Germany, Italy and Paris. On his return he began practising at Boston, but abandoned this for the study of the sciences. In 1836 he became State Geologist of Maine, and later held the same post in Rhode Island 1839 and in New Hampshire 1840. He claimed to have been the first to indicate, in 1832, the applicability of electricity to telegraphic use, and also claimed, in 1842, to have been the discoverer of the anæsthetic effects of the inhalation of ether. In 1844 he conducted extensive research in the south shore lands of Lake Superior, and from 1847–49 was United States surveyor of mineral lands in Michigan. He received the monthly prize of 2,500 francs from the French Academy of Sciences in 1852. He published a 'Manual of Etherization, with a History of its Discovery' (1861), and several 'Reports.'

JACKSON, Sir Cyril, English sociologist: b. about 1859. He was educated at New College, Oxford; studied for the bar and in 1891 was chosen member of the London School Board. Subsequently he migrated to Australia where he served as inspector general of schools in West Australia from 1903 to 1906. In 1910 he returned to London as acting agent-general for West Australia and in 1913 was elected alderman of the London County Council, of which he was chairman in 1915. Many of his official reports are monographs on child labor and the condition of the unemployed and problems incident thereto. He has also published 'Unemployment and Trade Unions' (1910), and 'Outlines of Education in England' (1914); 'The Religious Question in Public Education.' In 1915 he was chairman of the advisory committee on national register and in the following year was vice-chairman on war pensions, etc., statutory committee. He was knighted in 1917.

JACKSON, Dugald Caleb, American electrical engineer: b. Kennett Square, Pa., 13 Feb. 1865. In 1885 he was graduated at the Pennsylvania State College, and took a post-graduate course in electrical engineering at Cornell in 1885–87. For the next two years he was vice-president and engineer of the Western Engineering Company at Lincoln, Neb. Subsequently he was assistant chief engineer of the Sprague Electric Railway and Motor Company and chief engineer of the central district of the Edison General Electric Company. He is now consulting engineer and member of the firm of D. C., and W. B. Jackson. From 1891 to 1907 he also served as professor of electrical engineering at the University of Wisconsin and since 1907 has been in charge of the department of electrical engineering at the Massachusetts Institute of Technology. He has published 'A Textbook on Electricity and Magnetism and the Construction of Dynamos' (1893); 'Electricity and Magnetism' (1895); 'Alternating Currents and Alternating Current Machinery' (1896; new ed. 1913); 'An Elementary Book on Electricity and Magnetism and their Applications' (1902) and many papers on professional topics.

JACKSON, Edward Payson, American author: b. Erzerum, Turkey, 15 March 1840; d. 1905. He was educated at Amherst College; served in the Union army during the Civil War as private of the 45th and lieutenant of the 5th Massachusetts; was principal and superintendent of various educational institutions, and in 1877 was appointed master in the Boston Latin School. His works include 'Mathematical Geography' (1873); 'A Demigod' (1886), a story published anonymously, and at first attributed to various well-known authors; 'The Earth in Space' (1889); and 'Character Building' (1892), to which was awarded a prize of $1,000, offered by the American Secular Union, jointly with N. P. Gilman's 'The Laws of Daily Conduct,' with which it was also published in the volume, 'Conduct as a Fine Art' (1894). He also became the editor of *The Bohemian*, a Boston magazine of short fiction.

JACKSON, Frederick George, English Arctic explorer: b. Alcester, Warwickshire, 1860. He was educated at Denstone College and the University of Edinburgh, made journeys across the Australian deserts and the Great Tundra of Siberia, in 1894–97 was leader of the Jackson-Harmsworth expedition to Franz Josef Land, and during the second Boer War was in command of a company of mounted infantry. During his stay in Franz Josef Land he mapped the region, which he proved to be a collection of islands, and made valuable magnetic and meteorological observations. He was awarded the gold medal of the Paris Geographical Society in 1899, and wrote 'The Great Frozen Land' (1895); 'A Thousand Days in the Arctic' (1899).

JACKSON, Gabrielle Emilie (Snow), American writer for young people: b. New York, 13 Oct. 1861. Among her many publications are 'Denise and Ned Toodles' (1897); 'The Colburn Prize' (1899); 'Pretty Polly

Perkins' (1900); 'Laddie and Lassie' (1900); 'Caps and Capers' (1901); 'Three Graces' (1903); 'Three Graces at College' (1904); 'Mother and Daughter' (1904); 'Little Miss Cricket Series' (1905); 'Wee Winkles and Wideawake' series (1906); 'Ned Toodles the Second' (1906); 'A Blue Grass Beauty' (1907); 'Joy of Piney Hill' (1907); 'Sunlight and Shadow' (1907); 'The Dawn of Womanhood' (1907); 'Three Little Women' series (1908); 'A Maid of Middies' Haven' (1909); 'Captain Polly of Annapolis' series (1910–11); 'Peggy Stewart' series (1911–12); 'Peterkin' (1914); 'Silverheels' (1916).

JACKSON, George, English and Canadian clergyman and educator: b. 15 Oct. 1864. Educated at Collegiate School, Grimsby, Wesleyan Methodist College, Richmond and London University. In 1880 he entered the Wesleyan Methodist ministry and was in charge of the Clitheroe circuit. Superintendent of the Wesleyan Methodist Mission, Edinburgh, 1889–1906; pastor of Sherbourne Street Methodist Church, Toronto, 1906–09; professor of the English Bible, Victoria College, Toronto University, 1909–13; since 1913, professor of Pastoral Theology and Church Organization, Didsbury College, Manchester, England. He is the author of 'First Things First' (1894); 'The Table Talk of Jesus' (1896); 'Judgment, Human and Divine' (1897); 'The Ten Commandments' (1898); 'A Young Man's Bookshelf' (1898); 'A Young Man's Religion' (1900); 'Memoranda Paulina' (1901); 'The Old Methodism and the New' (1903); 'The Teaching of Jesus' (1903); 'The Fact of Conversion' (1908); 'Studies in the Old Testament' (1909); 'The Preacher and the Modern Mind' (Fernley Lecture, 1912); 'In a Preacher's Study' (1914); 'Leaves of Healing' (1916).

JACKSON, George Anson, American Congregational clergyman: b. North Adams, Mass., 17 March 1846. He was graduated from Yale in 1868, from the Andover Theological Seminary in 1871, was ordained to the Congregational ministry, and in 1872–97 held pastorates successively at Leavenworth, Kan., Southbridge, Mass., and Swampscott, Mass. In 1897 he became librarian of the General Theological Library of Boston. He wrote 'The Apostolic Fathers' (1879); 'Fathers of the Third Century' (1881); 'Post-Nicene Greek Fathers' (1883); 'Post-Nicene Latin Fathers' (1883); 'The Son of a Prophet' (1894), a historical novel.

JACKSON, George Thomas, American dermatologist: b. New York, 19 Dec. 1852; d. 3 Jan. 1916. He received his education at the College of the City of New York and at the universities of Berlin, Vienna and Strassburg. In 1878 he was graduated in medicine at Columbia University and for the next six years was engaged in general practice. He finally gave special attention to dermatology, in which he lectured at the New York Woman's Medical College from 1890 to 1899, and also at the University of Vermont and at Columbia. His published works are 'Diseases of the Hair and Scalp' (1887, 1893); 'The Ready Reference Handbook of Diseases of the Skin' (1893; 7th ed., 1914); 'Treatise on the Diseases of the Hair,' with C. W. McMurtry (1912).

JACKSON, Helen Maria Fiske Hunt, "H. H.," American novelist and poet: b. Amherst, Mass., 18 Oct. 1831; d. San Francisco, 12 Aug. 1885. At 21 she married Capt. Edward Hunt (d. 1863) of the United States army, and began the wandering existence of an army officer's wife. From 1867 to her death, 16 years later, her pen hardly rested. She wrote verses, sketches of travel, essays, children's stories, novels and tracts for the time, generally over the pen-name "H. H." Her life in the West after her marriage to W. S. Jackson, a banker of Colorado Springs, revealed to her the wrongs of the Indian, which she set herself at once to redress. Newspaper letters, appeals to government officialism, and finally her 'Century of Dishonor' (1881), a sharp arraignment of the nation for perfidy and cruelty toward its helpless wards, were her service to this cause. Her most popular story, 'Ramona,' (1884), a romance whose protagonists are of Indian blood, was also an appeal for justice. This book, however, rose far above its polemic intention; the beauty of its descriptions, its dramatic movement, its admirable characterization, and its imaginative insight entitling it to high rank. Two novels in the 'No Name Series' — 'Mercy Philbrick's Choice' (1876) and 'Hetty's Strange History' (1877) — show the qualities that infuse her prose: color, brilliancy of touch, grace of form, certainty of intuition and occasional admirable humor. She had not the gift of construction and lacked the power of self-criticism; so that she is singularly uneven. It is no doubt chiefly her poems which have gained for "H. H." a place in literature. They reveal genuine lyrical power, although at times marred by defective technique. Among books of hers not already named are 'Bits of Travel' (1873); 'Glimpses of Three Coasts'; 'Sonnets and Lyrics' (1886). To her have often been attributed the noted 'Saxe Holm' stories. Consult Higginson, T. W., 'Contemporaries' (Boston 1900). See RAMONA.

JACKSON, Henry Rootes, American diplomat and soldier: b. Athens, Ga., 24 June 1820; d. Savannah, Ga., 23 May 1898. He was graduated at Yale in 1839, admitted to the bar in Georgia and for several years was district attorney. He served in the Mexican War, became judge of the Superior Court, and in 1853 went to Vienna as chargé d'affaires, and the following year was made Minister resident there resigning in 1858. Before the outbreak of the Civil War he seceded from the Charleston Convention and, when his State seceded, commanded the State troops. He eventually resigned and joined the Confederate forces. Near the close of the war he was made a brigadier-general in Hood's army and was captured with his whole command at Nashville after the battle of Franklin. In 1885 he was appointed United States Minister to Mexico, but resigned in the following year, because of a disagreement with government authorities over the ruling in the case of the American schooner *Rebecca*, which had been seized by the Mexicans on the charge of smuggling. He was the author of 'Tallulah, and Other Poems' (1850).

JACKSON, Howell Edmunds, American jurist: b. Paris, Tenn., 8 April 1832; d. West Meade, Tenn., 8 Aug. 1895. He was graduated from the University of Virginia in 1854, from

the law department of Cumberland University in 1856, began practice in Jackson and later in Memphis, and upon the organization of the Confederate government became receiver for property in West Tennessee confiscated to the purposes of the Confederacy. Subsequent to the war he became a member of the Court of Referees of Tennessee, a tribunal which acted as a provisional Supreme Court in the hearing of cases that had arisen during the war period. Elected to the State legislature in 1880, he took his seat in the United States Senate in 1881, afterward left the Senate to become United States Circuit Court judge for the West Tennessee district, and in 1893 was appointed an associate justice in the United States Supreme Court.

JACKSON, James, American soldier and statesman: b. Moreton Hampstead, Devonshire, England, 21 Sept. 1757; d. Washington, D. C., 19 March 1806. He emigrated to America with his father in 1772 and studied law in Savannah. In March 1776 he aided in repelling a British attack upon that town, was appointed member of the first constitutional convention of Georgia in 1777 and subsequently was appointed brigade major of the Georgia militia. In 1781 he aided in the capture of the fort at Augusta, and was left in command of the place and upon the evacuation of Savannah by the British in 1782 was appointed by General Wayne to receive the keys of the town. In 1789 he was chosen a representative in Congress, and from 1792 to 1795 was a member of the United States Senate. He had the principal share in the framing of the Georgia constitution of 1798 and upon its adoption was elected governor of the State and held that office until his re-election in 1801 to the United States Senate. He was a Jeffersonian in his political views.

JACKSON, James, American physician, brother of Charles Jackson (q.v.): b. Newburyport, Mass., 3 Oct. 1777; d. 1867. He was graduated at Harvard College in 1796; studied medicine in London and on his return to Boston in 1800 commenced practice there, devoting himself entirely to medical practice, to the exclusion of surgery and other branches. In 1803 he became a member of the Massachusetts Medical Society, of which he later became president. In 1810, with Dr. John C. Warren, he brought before the community a proposition for establishing a hospital in the city of Boston. The first result of this was the organization of the asylum for the insane at Somerville, then included in Charlestown, and afterward of the Massachusetts General Hospital in Boston. Dr. Jackson was the first physician, and Dr. Warren the first surgeon to this institution. In 1810 he was chosen professor of clinical medicine in Harvard, and in 1812 professor of theory and practice, becoming professor emeritus in 1835. His principal publications were 'On the Brunonian System' (1809); 'Remarks on the Medical Effects of Dentition'; 'Letters to a Young Physician' (1855). Of the last work several editions were printed. Consult Putnam, 'Memoir of Dr. James Jackson' (Boston 1905).

JACKSON, John Adams, American sculptor: b. Bath, Me., 5 Nov. 1825; d. Pracchia, Tuscany, 30 Aug. 1879. He was apprenticed to a machinist in Boston, where he gave evidence of talent by modeling a bust of Thomas Buchanan Read. He studied linear and geometrical drawing in Boston, gave much time to crayon portraits and then went to Paris, where he studied under Suisse. In 1858 he went to New York and remained there until 1860, when he returned to Florence, which was afterward his home. His portrait busts include those of Daniel Webster (1851), Adelaide Phillips (1853) and Wendell Phillips (1854). His ideal productions are noted for their anatomical accuracy and graceful treatment. These include 'Eve and the Dead Abel' (1862); 'Autumn,'; 'Cupid Stringing his Bow'; 'Titania and Nick Bottom'; 'The Culprit Fay'; 'Dawn'; 'Peace'; 'Cupid on a Swan'; 'The Morning Glory'; 'Reading-Girl'; 'Musidora' (1873); 'Hylas' (1875) and 'Il Pastorello.' He designed a statue of Dr. Elisha K. Kane, the Arctic explorer, in 1860; a group for the southern gatehouse of the reservoir in Central Park, N. Y. (1867) and the soldiers' monument at Lynn, Mass. (1874).

JACKSON, Mercy Bisbee, American physician: b. Hardwick, Mass., 17 Sept. 1802; d. Boston, 13 Dec. 1877. She was graduated at the New England Female Medical College in 1860, having previously practised medicine in Plymouth, Mass., for 20 years and in Boston for 15 years. She was the first woman that was admitted to the American Institute of Homœopathy in Philadelphia, in June 1871, became a member of the Massachusetts Homœopathic Society and of the Boston Homœopathic Society in 1873, and in that year was made professor of diseases of children in the Boston University School of Medicine, which office she held until her death. She was twice married, her first husband being the Rev. John Bisbee, and her second, Capt. Daniel Jackson, of Plymouth. She was an active worker for the cause of temperance and woman suffrage, addressed large audiences and contributed frequently to the *Woman's Journal,* published in Boston.

JACKSON, Patrick Tracy, American merchant brother of Charles Jackson (q.v.): b. Newburyport, Mass., 14 Aug. 1780; d. Beverly, Mass., 12 Sept. 1847. At the age of 15 he was apprenticed to a merchant of Newburyport and subsequently established himself in Boston in the India trade, in which he acquired a handsome fortune. In 1812, at the invitation of his brother-in-law, Francis C. Lowell, who had recently examined the process of the cotton manufacture in England, he engaged in a project to introduce the power loom, then newly invented, and the mode of constructing which was kept secret, into the United States. After repeated failures they succeeded in 1812 in producing a model from which a machine was subsequently constructed by Paul Moody. In 1813 they built their first mill at Waltham, near Boston, the first in the world that combined all the operations for converting the raw cotton into finished cloth. In 1821 Jackson made large purchases of land on the Merrimack River near the Pawtucket canal, on which a number of mills were constructed by the Merrimack Manufacturing Company, a corporation organized under his auspices. This settlement formed the germ of the present city of Lowell. He procured in 1830 a charter for a railroad be-

tween Lowell and Boston and directed its construction until completion.

JACKSON, Samuel Macauley, American church historian: b. New York, 19 June 1851; d. Washington, Conn., 2 Aug. 1912. He was graduated from the College of the City of New York in 1870, from the Union Theological Seminary in 1873, and after further study at Leipzig (1873–76), held the pastorate of the Presbyterian Church at Norwood, N. J., in 1876–80. From 1895–1912 he was professor of church history in New York University, and was chosen secretary of the church history section of the American Historical Association. He was assistant editor of Schaff's 'Bible Dictionary' in 1878–80, associate and managing editor of the 'Encyclopædia of Religious Knowledge' in 1880–84, and edited 'A Concise Dictionary of Religious Knowledge' (1891). He also prepared the first important bibliography of foreign missions (1891), wrote 'Huldreich Zwingli' (1901), the first original English biography of its subject, later enlarged and published as 'The Latin Works and the Correspondence of Huldreich Zwingli, together with Selections of his German works' in English translation (1912).

JACKSON, Sheldon, American educator: b. Minaville, N. Y., 18 May 1834; d. 1909. He was graduated at Union College in 1855, at Princeton Theological Seminary in 1858; was ordained to the ministry of the Presbyterian Church in the latter year; and was missionary to western Wisconsin and southern Minnesota in 1859–69. In 1869–82 he was superintendent of Presbyterian missions in western Iowa, Nebraska, the Rocky Mountain territories, Wyoming, Colorado, New Mexico, Arizona, Utah, and Montana, and from 1877 in Alaska. In 1885 he became United States general agent of education in Alaska, and in 1887 organized the Alaskan society of natural history and ethnology at Sitka. He aided in founding a missionary college in Utah in 1896, was moderator of the Presbyterian General Assembly in 1897, and wrote 'Alaska and Missions on the North Pacific Coast' (1880); 'Education in Alaska' (1881); annual reports on 'Education in Alaska' from 1886; and annual reports on the 'Introduction of Domestic Reindeer into Alaska' (1891–1901). Consult Stewart, R. L., 'Sheldon Jackson' (New York 1908).

JACKSON, Stonewall. See JACKSON, THOMAS JONATHAN.

JACKSON, Thomas, English Wesleyan clergyman, educator and editor: b. Sancton, Yorkshire, 12 Dec. 1783; d. Shepherd's Bush, London, 10 March 1873. He was largely a self-made man. He was editor of *The Wesleyan Methodist Magazine* and also of *The Youths' Instructor and Guardian,* 1824–42; professor of divinity in the Richmond Theological College, 1842–61. He edited a new edition of 'John Wesley's Christian Library' (30 vols.). He also edited 'The Works of John Wesley' (14 vols., 1829–31); 'A Library of Christian Biography' (12 vols., 1837–40); 'The Lives of the Early Methodist Preachers' (3 vols., 1837–38; 3d ed., 6 vols., 1865–66); 'Anthony Farindon's Sermons' (4 vols., 1849); 'The Journal of the Rev. Charles Wesley' (2 vols., 1849). He was the author of many volumes and pamphlets. The most important are 'The Life of John Goodwin' (1822); 'Memoirs of the Life and Writings of Rev. Richard Watson' (1834); 'The Centenary of Wesleyan Methodism' (1839); 'The Life of Rev. Charles Wesley' (2 vols., 1841); 'The Life of Rev. Robert Newton' (1855); 'The Institutions of Christianity' (1858); 'The Apostolic Churches in the Holy Land' (1886); 'Recollections of My Own Life and Times' (ed. by B. Frankland, 1873). Consult also Dunn, Samuel, 'Recollections of Thomas Jackson and His Acts' (1873). His large library is now the property of Garrett Biblical Institute, Evanston Ill.

JACKSON, SIR Thomas Graham, English architect: b. Hampstead, 21 Dec. 1835. He was educated at Oxford University and became a pupil of Sir George Gilbert Scott (q.v.) (1858–61), making a specialty of the Gothic style. He has designed most of the new scholastic buildings in Oxford, Cambridge, Eton, Westminster School, Rugby, Harrow, etc., and has restored Great Malvern Priory, Bath Abbey and Winchester Cathedral, besides building many new Gothic churches. He has written 'Modern Gothic Architecture' (1873); 'Wadham College, Oxford; its History and Buildings' (1893); 'The Church of Saint Mary the Virgin, Oxford: Reasons in Architecture' (1906); 'Byzantine and Romanesque Architecture' (1913); 'Gothic Architecture in France, England and Italy' (1915); 'A Holiday in Umbria' (1917). He was created a baronet in 1913.

JACKSON, Thomas Jonathan, commonly called "STONEWALL JACKSON," American general: b. Clarksburg, Harrison County, W. Va., 21 Jan. 1824; d. near Chancellorsville, Va., 10 May 1863. Lieutenant-General Thomas Jonathan Jackson was one of the most unique, romantic characters of the War between the States, and crowded into the two years in which he served brilliant achievements which won him wider fame than any other soldier on either side. Descended from Scotch-Irish stock and inheriting many of the qualities of his ancestry, he was left a penniless orphan when three years old, and soon showed "the stuff of which heroes are made," in his manly self-reliant efforts to support himself. Learning of a vacancy from his Congressional district in the military academy at West Point, he determined to make the journey to Washington and seek the appointment, and set out at once — traveling a part of the way on foot — appearing before the member of Congress from his district in his suit of homespun, and with his leather saddlebags over his shoulders. The Congressman presented him to the Secretary of War, who was so much pleased with the youth's determination that he at once made out his appointment to West Point. He was very badly prepared to enter the academy and barely "squeezed through" on his entrance examination, but by persevering work he gradually rose in his grade until in July 1846 he was graduated No. 17 in a brilliant class containing such men as McClellan, Foster, Reno, Stoneman, Couch, Gibbon, A. P. Hill, Pickett, Maury, D. R. Jones, Wilcox and others; and one who knew him intimately expressed the confident belief that if the course had been longer "Old Jack" would have graduated at the head of his class. He imme-

diately reported for duty in Mexico, and serving in the artillery won distinction on every field, always seeking the post of danger, being made first lieutenant at the siege of Vera Cruz, brevetted captain at Contreras and Churbusco, and major at Chapultepec, rising to this rank in seven months, and being promoted more rapidly than any other officer of his grade in the Mexican War. He was frequently and honorably mentioned in the official reports, and John B. Magruder, his immediate superior, wrote of him: "If devotion, industry, talent and gallantry are the highest qualities of a soldier, then he is entitled to the distinction which their possession confers."

On the recommendation of his old comrade, D. H. Hill, whose brother-in-law he afterward became, Jackson was elected, in 1851, professor of natural science and instructor of military tactics in the Virginia Military Institute, Lexington, Va., being elected over McClellan, Reno, Rosecrans and G. W. Smith, whose names were submitted by the faculty at West Point. He made little reputation as a professor, and the cadets were always playing pranks upon him, and laughing at his eccentricities. From his habit of instructing his own servants in Scripture lessons every Sunday afternoon grew his famous negro Sunday school to which he devoted so much time and thought to which he contributed so liberally of his moderate means, — sending his pastor checks for it in the midst of his most active campaigns,— and which made such an impress upon the negroes and gave Jackson so warm a place in their affections that the first contribution to his monument was made in 1887 by the negro Baptist Church of Lexington. Jackson was a Union man, opposed to secession as a remedy for Southern wrongs, though thoroughly believing in the abstract right of a State to secede, and greatly deprecated the war which he predicted would follow; but when the news reached the quiet little town of Lexington that Mr. Lincoln had called for 75,000 troops to coerce sovereign States, and that the Union Convention of Virginia had passed an ordinance of secession, Jackson said in a speech before a public meeting: "I have longed to preserve the Union and would have been willing to sacrifice much to that end. But now that the North has chosen to inaugurate war against us, I am in favor of meeting her by drawing the sword and throwing away the scabbard." Governor Letcher, his old neighbor and friend, who had a high estimate of his abilities, commissioned him colonel in the Virginia forces; but his brilliant record in Mexico had been forgotten — he was only thought of as the quiet, eccentric professor, and when his name was presented to the Virginia convention, a prominent member arose and asked: "Who is this Major Jackson, anyway?" and it required all the eloquence of the Rockbridge delegates to secure his confirmation.

Marching the corps of cadets to Richmond where he remained for a brief season assisting in organizing and drilling the raw recruits in the "Camp of Instruction," he was ordered to Harper's Ferry on 3 May, where he bent his energies toward reducing the high-spirited rabble who had rushed to the front at the first sound of the bugle to the respectable Army of the Shenandoah, which he turned over to the command of General J. E. Johnston 23 May. Placed in command of the Virginia brigade which afterward became so famous, he met the advance of General Patterson at Falling Waters on 2 July, gave them a decided check, and captured a number of prisoners. Soon after he received his commission as brigadier-general in the following characteristic letter from General Lee:

RICHMOND, 3rd July, 1861.

MY DEAR GENERAL:— I have the pleasure of sending you a commission of brigadier-general in the Provisional Army; and to feel you merit it. May your advancement increase your usefulness to the State.

Very truly,

R. E. LEE.

But it was in the battle of first Manassas (Bull Run) that Jackson won his new name and fame, and the ringing words of the gallant Bee: "There stands Jackson like a stone wall," changed the name of "Thomas Jonathan" into the immortal "Stonewall" Jackson. He was wounded in the hand but refused to leave the field, and while the surgeons were dressing his wounds President Davis rode on the field, and Jackson, pushing aside the surgeons, tossed his cadet cap in the air and exclaimed: "Hurrah for the President. Give me ten thousand men and I will be in Washington to-night!" In September he was made major-general, and was sent on 4 October to command the "Valley District" and enter in the early part of 1862 on that famous "Valley Campaign," which is now studied in military academies in Europe as illustrative of able strategy, rapid movements, and heroic fighting. In March he fell back before Banks' army of 35,000 men, and Banks reported him "in full retreat from the valley" and started a column to cross the mountains and attack Johnston in flank as he was falling back from Manassas, when Jackson suddenly turned, marched 18 miles in the morning, and with 2,700 men fought at Kernstown, near Winchester, 8,000 of the enemy, and though sustaining the only defeat that ever befell him he accomplished his purpose in recalling the column which was moving on Johnston's flank, quietly moved up the valley and took a strong position in Swift Run Gap from which he could easily defend himself or strike the enemy if he attempted to move on Staunton. Ewell's division coming to take his place, he left this grim soldier to watch Banks, and moved so secretly that neither friend nor foe had divined his plans until he thrilled the Confederacy and sent terror to the North by the following laconic and characteristic dispatch:

Valley District, May 9th, 1862.

GEN. S. COOPER:— God blessed our arms with victory at McDowell yesterday.

T. J. JACKSON, Major-General.

He had defeated the advance of Fremont under Milroy and driven it back in great confusion. Then followed in rapid succession the uniting of Ewell's division with his at Luray, the driving in of Banks' flank at Front Royal, the cutting of his retreating column at Middletown, and on 25 May the rout of Banks' army from the heights of Winchester, and driving him pellmell across the Potomac. He was about to cross the Potomac into Maryland in pursuit of Banks when he learned that Fremont from the west, and Shields, the head of McDowell's column, from the east, were marching to form

THOMAS JONATHAN (" STONEWALL ") JACKSON

a junction in his rear at Strasburg. He at once put his army in motion and by forced marches (one of his brigades marched 52 miles in one day) he reached the point of danger in time to hold Fremont in check with one hand and Shields with the other until his whole army, prisoners and immense wagon trains loaded with captured stores passed on in safety. He then moved leisurely up the valley, burning the bridges over the Shenandoah to prevent a juncture between Fremont and Shields — his rear being protected by that chivalrous knight and brave soldier, Gen. Turner Ashby, who filled the valley with the fame of his brilliant achievements, and whose fall in a severe fight near Harrisonburg on 6 June was sadly lamented as a great calamity to the Confederate cause. On 7 June, at Cross Keys, Ewell badly defeated Fremont, and on 8 June, at Port Republic, on the opposite side of the river, Jackson routed Shields, and the armies sent to "crush" him were soon rapidly retreating down the valley, while "Stonewall" — that name will cling to him, but "Thunderbolt," "Tornado," or "Hurricane," would be more expressive of his character, — remained master of the situation. This campaign may be thus summarized: In 32 days Jackson and his "foot cavalry" had marched nearly 400 miles, skirmishing almost daily, fought five battles, defeated three armies, two of which were completely routed, captured 20 pieces of artillery, 4,000 prisoners, and immense quantities of stores of all kinds, and had done all this with a loss of fewer than 1,000 men killed, wounded and missing, and with a force of only 15,000 men, while there were at least 60,000 men opposed to him. He had spread consternation throughout the North and had neutralized McDowell's 40,000 men at Fredericksburg, who were about to march to the aid of McClellan in investing Richmond. Jackson now rested for a brief season, was reinforced from Lee's army, made the impression on the enemy that he would advance down the valley again, and managed matters so secretly that Banks at Strasburg was busily engaged in fortifying against an expected attack from him at the very time he was thundering on McClellan's flank at Richmond over 200 miles away. The part he bore in the Seven Days around Richmond, the second Manassas campaign, and the Maryland campaign was so conspicuous and so important that it would be, indeed, to write the history of the army to give it in detail. His skill and daring in the Seven Days battle, his defeat of Pope's advance under Banks at Cedar Run, his flank march to Pope's rear, and the pertinacity with which he held him at bay along the Warrenton road until Lee could come up with Longstreet and drive him into the fortifications around Washington, his capture of Harper's Ferry with 11,000 prisoners, 13,000 stand of small arms, 73 pieces of artillery, and large quantities of provisions and stores of every description, and his conduct on the field of Sharpsburg, all added greatly to the fame of Stonewall Jackson and his grand old corps of "Foot Cavalry." It was the privilege of the writer of this sketch to have been under Jackson during the whole of his brilliant career, and it may not be amiss to describe him as he appeared at the head of his victorious legions; about 37 years old, six feet tall, medium build, gray-blue eyes, light brown hair, set jaw and wide nostrils. He wore a plain gray uniform which soon became faded and soiled, cavalry boots and an old gray cadet cap with its rim tilting on his nose. He rode a raw-boned sorrel horse which the men said "could not run except toward the enemy," but whenever he appeared among the troops they would begin to give the Confederate yell, and he would take off his cap, put spurs to "Little Sorrel" and gallop away from them as rapidly as possible. On 10 Oct. 1862 he was made lieutenant-general, and his corps made to consist of his old division, under W. B. Taliaferro, Early's division, A. P. Hill's division, and D. H. Hill's division, Colonel Brown's regiment of artillery, and numerous light batteries. At Fredericksburg, 13 Dec. 1862, he held the extreme right of Lee's army, and defeated with great slaughter Franklin's attack upon him. The following winter and spring Jackson spent in improving the organization, discipline and efficiency of his corps, and as, in his judgment, a most important means of accomplishing this, he labored to have chaplains in every regiment and missionaries to visit the army, and did everything in his power to promote the religious welfare of his soldiers. It was largely through his influence that a chaplains' association was formed, and he had regular prayer-meetings at his headquarters during the weeks and preaching on Sundays. But the end hastened on, General Hooker threw Sedgwick across the river below Fredericksburg the latter days of April 1863, crossed the bulk of his army above and strongly fortified his lines at Chancellorsville in the confident hope that Lee would either retreat on Richmond, or attack him in his strong position, where a crushing defeat would await him. But instead of doing either of these things Lee left Early to watch Sedgwick, moved up to Hooker's front, and sent Jackson with 22,000 men to make a march to Hooker's flank and rear. This was brilliantly executed and Jackson routed that flank of Hooker's army, and was proceeding to cut him off from his line of retreat and take a position where Hooker would have been compelled to attack him, when in returning from one of those bold reconnoissances which he so frequently made, his party was mistaken for the enemy and fired on by his own men and he was very severely wounded. His left arm was amputated, his other wounds dressed, and he was doing well and gave every promise of recovery, when pneumonia, brought on by exposure before the battle, set in and he died at a quarter past three P.M., Sunday, 10 May 1863.

The great soldier had fought his last battle, won his last victory, and gone to wear his glittering "crown of rejoicing." He was buried as he had requested in "Lexington in the valley of Virginia." A beautiful bronze statue marks his grave; on the hill at the Virginia Military Institute has been reared the stately "Jackson Memorial Hall," and in the capitol square of his native State stands the noble bronze statue, the gift of English admirers. Lee spoke his fittest eulogy when he wrote him after hearing that he was wounded: "Could I have dictated events I should have chosen for the good of the country to have been disabled in your stead." Consult Cooke, J. E., 'Stonewall Jackson: A Military Biography' (New York 1876);

Jackson, M. A. M.; 'Memoirs' (Louisville 1895); Henderson, 'Stonewall Jackson and the Civil War' (2 vols., New York 1902).

J. WM. JONES.

JACKSON, Mich., city and county-seat of Jackson County; situated on both banks of the Grand River; 37 miles south of Lansing, 74 miles west of Detroit, 209 miles east of Chicago, 71 miles northwest of Toledo, 100 miles north of Fort Wayne, and on the main line of the Michigan Central Railroad. It is the termini of the Grand Rapids Division, Saginaw Division, and Air Line Division of the Michigan Central; of the Toledo Division, and the Fort Wayne Division of the New York Central Railroad; of the Cincinnati Northern, a part of the Big Four system; of the Michigan Air Line, a branch of the Grand Trunk Railroad. It is connected with Detroit, also, by an electric road known as the Detroit United Railway, and is connected with Battle Creek, Kalamazoo, Grand Rapids, Lansing, Owosso and Saint Johns by an electric system known as the Michigan Railway Company, the main offices of which are in Jackson. Jackson is situated in a rich, agricultural region and carries on an extensive trade in fruits, grains and vegetables. Among its chief manufactures are sewer pipe, automobiles, automobile accessories, oil stoves, corsets and underwear, waists and skirts, engines and motors, locomotives, wire fence, agricultural implements, oils and greases, chemicals and medicines and foundry products. Among the important industries are iron and steel, cigar making, Portland cement and mining. All the above employ about 14,000 hands, with a yearly output of more than $100,000,000. Coal and clay, the latter useful for pottery, are found nearby. There are five banks with a combined capital and surplus of $1,768,000, with total resources of $15,888,252; bank clearings for 1918 $53,568,324.53. There are six building and loan associations having combined assets of $5,576,538.21. Jackson is the home of the first association in Michigan. There are 34 church edifices of the various denominations. The school system is exceptionally fine, there being one city high school, two city intermediate high schools, 18 city grade schools, two parochial high schools and three parochial grade schools. There are two music conservatories and two business colleges. Among the prominent buildings are Carnegie library, the United States Government building, Elks temple, Masonic temple, City Club and the Arbeiter Verein Club buildings. The city also has a hospital and two sanitariums and there are located here also Mercy hospital, Young Men's and Young Women's Christian Association and the Odd Fellows State Home. There are two daily newspapers, one a morning paper and the other an evening paper with an aggregate circulation of 30,000. There are also three weeklies. In 1914 the city adopted the commission form of government and is operated under the city manager plan. The city is lighted by gas and electric light and owns and operates its waterworks. The first permanent settlement was made by Horace Blackman in 1829 and was first called Jacksonburg in 1830. In the same year a post office was established and named Jacksonapolis. In 1831 the township of Jacksonburg was formed and remained such until 1838 when the name was changed to Jackson. When the Michigan Central Railroad was constructed through the southern part of the State in 1841 Jackson grew rapidly, became a village in 1843, and an incorporated city in 1857. The inhabitants are mainly native born, though about one-third are of foreign descent, Irish, German, Polish and Italian predominating. Pop. about 55,000.

JACKSON, Miss., capital of the State, county-seat of Hinds County; on the Pearl River and on the Yazoo and Mississippi Valley, the Illinois Central and the Alabama and Vicksburg and other railroads; about 40 miles east of Vicksburg, on the Mississippi. The first permanent settlement was made in 1828 or 1829, and it was incorporated in 1840. In 1863 it was occupied for some time by Union forces under General Grant, and the ruins of the fortifications erected at the siege are still in existence. The city was nearly destroyed in 1864, by General Sherman. Jackson is situated in an agricultural region in which a large amount of cotton is raised. It is the commercial centre for a large section. The good railroad facilities and the advantage of traffic on the Pearl River are stimulating the increase of marketable agricultural and manufactured products. The chief industrial establishments are cottonseed-oil mills, fertilizer factories, sash, door and blind factories, foundries, brick-yards, a cotton-compress, a plow and harrow factory, a broom factory, lumber factory and cooper shops. Some of the principal public buildings are the State capitol, State charitable institutions for the blind, insane, deaf and dumb, the State library, Carnegie library and the James observatory. Among the private educational institutions of learning are the Millsaps College, founded in 1892 under the auspices of the Methodist Episcopal Church; and the Bellhaven College for young ladies. The old capitol, the Confederate monuments, and a statue of Jefferson Davis are also of interest. In 1913 the commission form of government was adopted. The waterworks are the property of the municipality. Pop. 26,990.

JACKSON, Ohio, city, county-seat of Jackson County; on Salt Creek, and on branches of the Baltimore and Ohio Southwestern, the Hocking Valley railroads, and on main line Detroit, Toledo and Ironton Railway, about 100 miles east of Cincinnati and 70 miles southeast of Columbia. Jackson is located in the vicinity of the early routes of travel from the Ohio River to the interior of what is now the State of Ohio, and on to the Great Lakes. The first permanent settlement was made in 1795, but it was not incorporated until 1847, several years after the limits of Ohio were decided. It is situated in a coal and iron mining section, but there is a large amount of good farming land in the vicinity. The chief industrial establishments of the city are foundries, machine-shops, furnaces, woolen-mills, a tannery and lumber yards. The coal and iron ore-mining of the vicinity contributes largely to the industrial wealth of the city. Pop. 5,468.

JACKSON, Tenn., city and county-seat of Madison County, situated about 80 miles northeast of Memphis, on the South Fork of the Forked Deer River, and on the Illinois Central,

Mobile and Ohio and Nashville, Chicago and Saint Louis and Birmingham and Northwestern railroads. It is the trade centre of a large and fruitful agricultural region, is an important cotton market, and has manufactures of engines and boilers, cotton goods, lumber, machinery, flour, cottonseed-oil, furniture, trunks, spokes and skewers, plows, carriages, bricks and other products. Here are located the Union University, the Memphis Conference Female Institute and Lane University. Jackson has a fine park, Carnegie library and modern municipal improvements, the waterworks and electric-light system being owned by the city. It has five banks with a combined capital of $528,150. The government is by commission, composed of three commissioners. Jackson was first settled in 1818. Jackson is in the centre of a net work of 210 miles of graded and graveled roads of Madison county. During the Civil War, Jackson was at times the headquarters of General Grant. It was captured by Union troops 7 June 1862. On 19 Dec. 1862, General Forrest sent detachments of cavalry to destroy the railroad to the north and south, and with 400 men advanced on Jackson and had a running fight with two regiments of Union infantry and detachments of cavalry under Colonel Engelmann of the 43d Illinois, who disputed Forrest's advance until the fortifications of the town were reached, when Forrest withdrew and moved on Humboldt and Trenton. On 13 July 1863, a Confederate cavalry force held the town and guarded a large number of conscripts. Col. Edward Hatch with 1,160 men of the 3d Michigan, 2d Iowa, 1st West Tennessee and 9th Illinois cavalry regiments attacked the Confederates and drove them from the town, releasing about 450 conscripts, and capturing 250 horses and nearly 400 stand of small arms. Hatch's loss was very slight. The Confederates had 38 killed and about 150 wounded. Consult 'Official Records' (Vol. XXIII). Pop. 15,779.

JACKSON (Miss.), Battle of. After the battle of Raymond (q.v.), 12 May 1863, General Grant, having provided for the safety of his rear and left from the direction of Vicksburg, turned McPherson's and Sherman's corps and part of McClernand's on Jackson, 12 miles northeast of Raymond, to capture the place without delay. On the 13th McPherson moved from Raymond to Clinton, and then turned east on Jackson. Sherman moved through Raymond to Mississippi Springs on the 13th, and that night arranged with McPherson that both columns should arrive at Jackson about the same hour next day. McClernand closed up to Raymond and sent one division to Clinton to support McPherson. Gen. J. E. Johnston had arrived at Jackson on the evening of the 13th and, hearing next morning of the Union approach on the Raymond and Clinton roads, ordered Gregg's brigade to take position on the first-named road, and Walker's brigade on the latter, with instructions to each to delay the Union advance as long as possible, to give time for the removal of public property from the city. The combined strength of Gregg and Walker was about 6,000 men. About 9 A.M. of the 14th McPherson's advance on the Clinton road came upon Walker's pickets and drove them back upon the main body, posted in works on the crest of a semi-circular ridge 2½ miles west of Jackson, the front covered by a marshy creek lined with dense willows, and artillery commanding the bridge over the creek. At the end of nearly two hours Crocker's division of three brigades was deployed in line, with one brigade of Logan's in reserve. At 11 A.M. the skirmishers advanced to the creek and were checked, upon which the entire division went forward, drove in Walker's skirmishers, and advanced over the open ground beyond the creek, meeting a stout resistance; but Walker's men soon retreated, abandoning seven guns. They were pushed more than a mile by Crocker; but his men fell into some disorder, and were finally brought to a stand by artillery posted in an inner line of works close to the town. While Crocker was reforming, Walker made his escape to the Canton road. Crocker's loss was 265 killed and wounded. On the Raymond road Sherman encountered Gregg and, by a flank movement, compelled him to abandon his entire line and ten guns, with the loss of nearly 200 prisoners and 81 in killed and wounded. Sherman's loss was 32. Johnston retreated northward on the Canton road. McPherson and Sherman entered Jackson between 3 and 4 P.M.; Sherman was left in the city to destroy the railroads, bridges, factories, arsenals and everything valuable. On the morning of 15th Grant turned the rest of his army west, defeated Pemberton at the battle of Champion's Hill (q.v.) on the 16th, drove him across the Big Black on the 17th, and began the siege of Vicksburg. The Union loss at Jackson was 42 killed and 251 wounded. The Confederates make their loss less than 400, but Sherman estimated it at 845 killed, wounded and missing. Consult 'War of Rebellion — Official Records' (Vol. XXIV, Washington 1889–1901); Johnston, J. E., 'Narrative of Military Operations' (New York 1877); Sherman, 'Memoirs' (Vol. I, New York 1875); The Century Company's 'Battles and Leaders of the Civil War' (Vol. III, New York 1887–88).

JACKSON, Siege of. The battle of Jackson (q.v.), 14 May 1863, was followed by the movement of General Johnston northwest, with Gregg's and Walker's brigades, to form a junction with Pemberton, who had been directed to join him; but early on the 19th he received word from Pemberton that he had decided to hold Vicksburg instead, upon which Johnston marched his troops to Canton. He was reinforced, and 29 June he marched west to operate in the rear of Grant, who was besieging Vicksburg. He was about to move on the morning of 5 July to the south of the Vicksburg and Jackson Railroad, when he heard that Vicksburg had fallen, whereupon he fell back to Jackson and occupied a line of works covering the town, with both flanks on Pearl River. General Sherman had been held in readiness to move back and drive the Confederates from the State, and when Vicksburg fell he moved promptly with his own corps and those of General Ord and Parke, crossed the Big Black at three different points, and by 11 July was close up to Johnston's works and shelling the city with nearly 100 guns. Ord's 13th corps was on the right, the 15th corps in the centre, and Parke's 9th corps on the left. On the 12th the fire of the artillery was increased, reaching

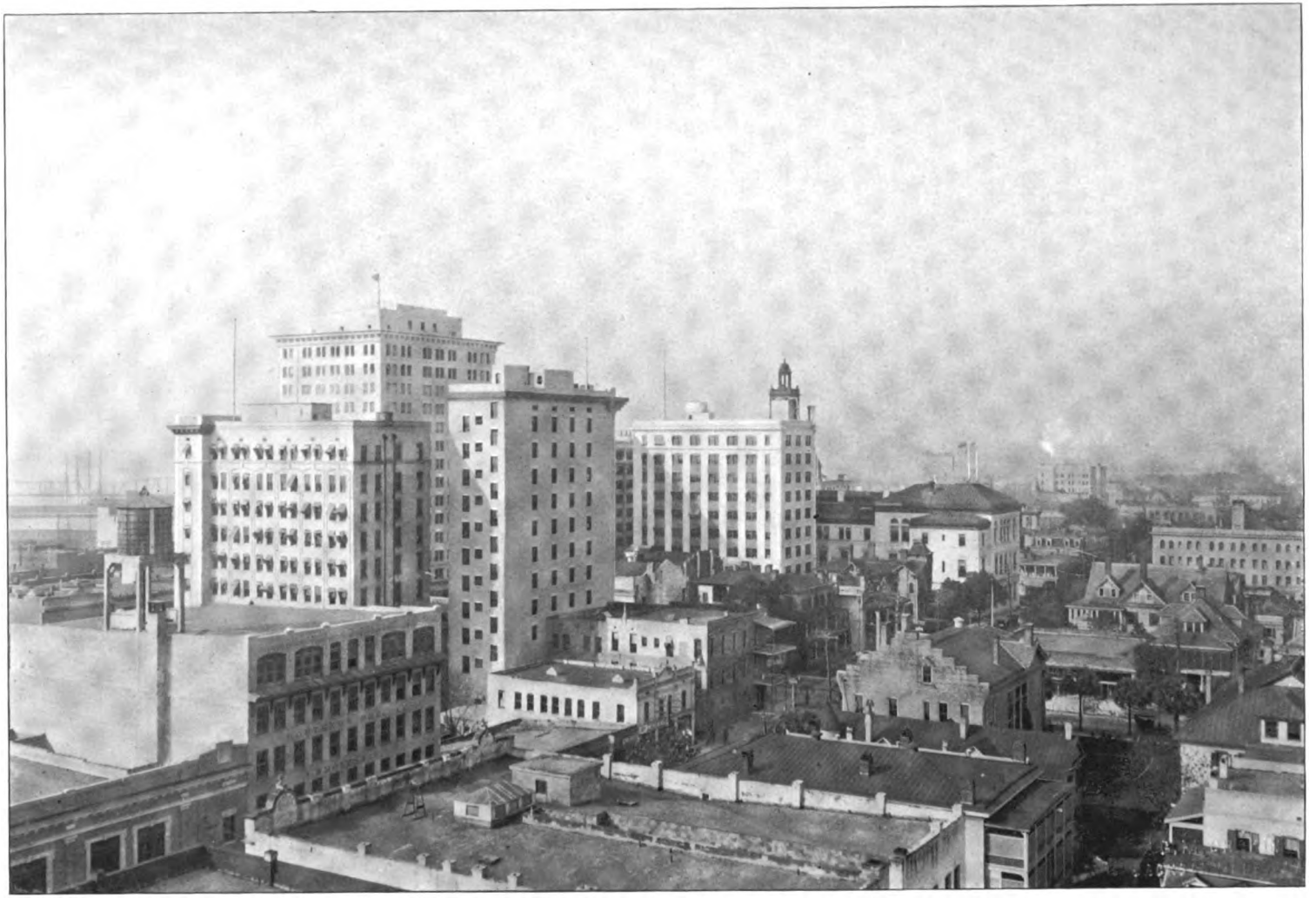
every part of the town, and Lauman's division of Ord's corps, moving in dense woods, came too close to the Confederate works, was struck in flank and driven back in disorder, losing over 500 men killed, wounded and captured, together with the colors of three regiments. The siege was prosecuted night and day, and on the morning of the 17th Jackson was found evacuated, Johnston having retreated on the road to Brandon, and thence to Morton, where he arrived on the 20th. Steele's division pursued Johnston as far as Brandon, 14 miles from Jackson; Sherman remained five days at Jackson, destroying much property of every description, and then returned to Vicksburg. The Union loss at Jackson, 11–16 July, was 129 killed, 762 wounded and 231 missing or captured. The Confederate loss, 5–25 July, was 71 killed, 504 wounded and 764 captured or missing. Consult 'Official Records' (Vol. XXIV, Washington 1889–1901); Johnston, J. E., 'Narrative of Military Operations' (New York 1877); Grant, 'Memoirs' (Vol. I, New York 1885–86); Sherman, 'Memoirs' (Vol. I, New York 1875); The Century Company's 'Battles and Leaders of the Civil War' (Vol. III, New York 1887–88).

JACKSONVILLE, Fla., chief city of the State, and seat of Duval County in the northeastern corner, on the west bank of the Saint John's, 24 miles from the ocean by water, 14 direct. It is an important trading port and one of the chief southern railroad centres, five great lines converging there, three of them trunk lines; the Southern Seaboard Air Line, Atlantic Coast Line, Georgia Southern and Florida, Florida East Coast and Jacksonville and Southwestern. It is 138 miles south of Savannah, 212 north of Tampa and 165 east of Tallahassee, and about 1,000 from New York, with train service of 25 to 28 hours. It is also connected with all the Atlantic coast cities by the Clyde, Merchant and Mines and Miami Steamship lines, and with the picturesque Saint John's and its tributaries by six daily and tri-weekly lines of steamers, over 3,300 vessels enter and clear the port annually. The fascinating rivers, lakes, everglades, etc., of Florida, the best hunting and fishing grounds east of the Mississippi, with Jacksonville's mild and healthful winter and even summer climate, make it one of the leading tourists' resorts in the country, some 80,000 to 100,000 stopping annually at its numerous large and well-equipped hotels.

Jacksonville's position makes it the business key and metropolis of the peninsula, the great shipping point of Florida's exports and the distributing point for its purchases. Of the former the chief are lumber, shingles and ties, mainly yellow pine from the great Florida forests; next come naval stores — for which it is the largest market in the world — turpentine, rosin and oil; phosphate and cotton have also increased and a heavy element is the shipping of fruit — oranges, pineapples and a great diversity of tropic fruits, (for which see FLORIDA) — and garden vegetables to the North. The total foreign exports in a recent year were valued at $1,371,300; the imports at $1,527,475. In a suburb of the city is the largest ostrich farm in the United States, and the only one east of California, whose products form part of the shipments; these also include great quantities of phosphates and fertilizers and kaolin. As a jobbing centre for interior trade it has the immense advantage of having practically no competitor in the State, and is rapidly becoming one of the foremost in the South; there are numerous large wholesale grocery houses and the annual volume of wholesale business done in the city of Jacksonville under normal conditions is as follows: Groceries, hay and feed, $23,000,000; dry goods and notions, $1,750,000; boots and shoes, $500,000; machinery and mill supplies, $1,750,000; hardware, $600,000; paints and oils, $250,000; fertilizer, $8,000,000; drugs, $1,250,000; miscellaneous, $10,750,000; total, $47,850,000. This business implies large banking facilities; and there are now four national and six State banks in the city, besides a savings bank with over $3,241,000 of capital, $2,578,610 undivided profits and $22,883,223 deposits.

Jacksonville has large and diversified manufacturing interests, having some 200 plants engaged in various lines of manufacture. Its chief specialty is lumber and timber products, which amounts to about one-fourth of the entire output of $6,500,000; there are 10 large saw and planing mills. Of the other industries the most considerable was the manufacture of ice. There were also three large shipbuilding plants, building both steel and wooden ships, foundry and other iron products, steam engineering works, brick and tile, paving and roofing materials, wooden ship and boat building, carriages, saddlery, mattresses, and palmetto fibre products, pulp, patent medicines, confectionery, cigars and other articles.

As a port it had long been hampered by shoals in the river and the bar outside the Saint John's. The river is a magnificent estuary, a mile wide for many miles up, and with a channel deep enough for the largest ocean vessels; but it was not until 1896, by combined government and local efforts, that a channel 19 feet deep was obtained from Jacksonville to the ocean, admitting vessels of 3,800 tons. The national government in 1901 appropriated $1,300,000 to deepen it to 24 feet all the way, with a permanent system of jetties and dredging. It has over seven miles of water front. The National River and Harbor Act of 1906 made further appropriations of $409,750 for the work and in 1907 set aside $100,000 for maintenance. By 1910 a 24-foot channel, now deepened to 30 feet was completed and from vessels of 637 tons in 1870 to vessels of 2,027 tons in 1907, vessels of 5,000 tons were entering the port in 1914. It has the largest dry dock facilities in the entire southeast, and ships are brought a long distance for repairs and other work. Five of the largest oil companies in the world make this one of the principal points of import for crude and refined petroleum and its by-products. The increase of oil-burning ships is bringing many of them to Jacksonville for their fuel supply, all of which adds much to the importance of the port. The freedom of the city from storms, it never having had in its history a storm serious enough to injure shipping, makes it particularly attractive as this is an advantage that many of the southern ports cannot boast. The city 7.6 square miles in area, is handsomely laid out, and its business section is almost entirely new, having been practically obliterated by a fire on 3 May 1901, which destroyed 148 blocks, covering 455 acres, and including 2,361 buildings, a property loss of over



JACKSONVILLE, FLORIDA

$15,000,000. With astonishing energy new buildings were erected, and greatly improved ones. Among the finest buildings are the Union station, United States post-office and custom-house, Masonic temple, Saint Lukes Hospital, National Bank of Jacksonville (which were spared by the fire). Among the public buildings since erected are the Windsor Hotel, Seminole, Elks, Women's and Wheelmen's clubhouses, Mercantile Exchange Bank, Board of Trade and Duval High School. A $50,000 Carnegie free library was erected. The religious denominations built a number of fine churches. Notable among them are the Congregational, Baptist, Christian, McTieire Memorial (M. E. South), Snyder Memorial (M. E.), Presbyterian, Saint John's Episcopal, Church of Good Shepherd, Episcopal and three fine churches for colored folk. There are five parks of 57 acres in all, "Hemming" having a Confederate monument; and 14 miles of shell streets and drives, besides a general macadamizing of paving with vitrified brick. The ocean beaches 18 to 20 miles off, are among the finest on the Atlantic Coast. The sanitation of the city is perfect. After the yellow fever epidemic of 1888 it installed a fine thorough system of sewerage, drained and filled in the swampy tracts around, and replaced the water supply with one almost chemically pure, drawn from artesian wells 500 to 1,000 feet deep. Its death rate has sunk to 10 in 1,000, one of the lowest in the country. There are 20 miles of trolley tracks, and the city owns electric light works and waterworks; both light and water are extremely cheap. The finances of the city are in the best condition. It has never defaulted its bonds, which are for the waterworks and electric plant, amounting to nearly $1,500,000 10 years ago, and now reduced. There is no floating debt. Assessed valuation 1914 was $59,274,580; tax 16 mills on the dollar, or 11 mills if beyond the hydrants. Jacksonville was settled in 1816 by Lewis Z. Hogans, whence Hogan's Creek, dividing the city, is named. In 1822 it was laid out and named after Andrew Jackson, the first territorial governor of Florida. It was incorporated in 1833. The Seminole War prevented its development, but it revived in 1842 and has grown steadily since. Its population in 1850 was 1,045; in 1870, 6,912; 1890, 17,201; 1900, 28,429, of whom 16,271 or 57 per cent were colored; 1910, 57,699; 1915, 70,173, and including suburbs, 92,160.

GEORGE E. LEONARD,
Executive Secretary and Treasurer Jacksonville Chamber of Commerce.

JACKSONVILLE, Ill., city and county-seat of Morgan County; situated on the Mauvaisterre Creek, a branch of the Illinois River, about 34 miles southwest of Springfield, State Capitol, and 88 miles north of Saint Louis, Missouri; on the Wabash, Chicago and Alton, Burlington and a branch of the Chicago, Peoria and Saint Louis railroads. Jacksonville was laid out as early as 1825, about seven years after the admission of the State of Illinois into the union, established as a town in 1840, incorporated as a city in 1867. It was made the county-seat of Morgan County in 1825. The origin of the name of the city is somewhat uncertain, but the most probable tradition seems to indicate that it was named in honor of Andrew Jackson, who was a prominent presidential candidate, at the time the town was founded. Jacksonville is noted for its institutions of learning, its wide, prettily elm-shaded streets, and its handsome residences. It is the seat of Illinois College, the oldest college in the State, founded through the efforts of local residents and a band of students from Yale College. Originally non-sectarion, the college has recently become Presbyterian, has absorbed the Jacksonville Female Academy and become affiliated with the University of Illinois. The Illinois Woman's College was established in 1847, under the auspices of the Methodist Episcopal Church and it is one of the largest woman's college in the West. The Illinois Woman's Academy and the College of Music are affiliated with the Illinois Woman's College. Among other institutions are the Jacksonville Business College, the home school of the chain of Brown's Business Colleges; Routt College, the largest free tuition Catholic college in the West; the State School for the Blind; the State School for the Deaf and Dumb; the State Central Hospital for the Insane; Our Saviour's Hospital in charge of the sisters of Holy Cross; the Passavant Memorial Hospital; a Carnegie free public library; the Conservatory of Music and Whipple Academy, a preparatory school. The last two are connected with Illinois College. The city hall, the county court-house, the high school, the David Prince School and the Ayers National Bank are the most prominent public buildings. Besides these there are numerous church edifices, the most attractive of which are the Grace Methodist Episcopal; the Christian and the Westminster Presbyterian. The most important industrial establishments of the city are woolen mills, J. Capps and Sons, established in 1839 (the largest concern in the United States manufacturing high grade men's clothing from the raw wool); the Illinois Steel Bridge Works; the Jacksonville Railway and Light Company (McKinley System) and the car shops of the Chicago, Peoria and Saint Louis Railroad. Other manufactures include cigars, meat and creamery products, machine-shop products, bricks, candy, novelty fixtures for department stores, paper and flour. The city has been under the commission form of government since 1911; it was one of the first cities to adopt this form of government. Jacksonville owns and operates its electric-light plant and waterworks, and maintains about 250 acres of beautiful parks and playgrounds. Pop. 16,638.

H. JAY RODGERS,
Secretary Jacksonville Chamber of Commerce.

JACKSONVILLE, Tex., town in Cherokee County, on the International and Great Northern, the Texas and New Orleans, and the Saint Louis Southwestern railroads, 120 miles southeast of Dallas. It contains Methodist and Baptist colleges and has a large trade in agricultural produce and fruit. Its industrial establishments are limited to saw mills, oil works, planing mills and basket and crate works. The town owns its water-supply system. Pop. 2,875.

JACMEL, or JACQUEMEL, Haiti, seaport on the south coast of the republic, on Jacmel Bay, 30 miles southwest of Port-au-Prince. The town is poorly built with narrow ill-paved streets. Harbor accommodations are

primitive and ocean-going vessels are unloaded and loaded by means of lighters. There is regular steamer communication with American and English ports. A consular agent of the United States is located at Jacmel. Pop. (commune) 35,000 to 45,000.

JACOB, from Hebrew word *Ya-aqob*, literally "to seize the heel," or "supplant," also called Israel, third patriarch and son of Isaac and Rebekah. The story of his life as told in Genesis has many dramatic incidents. The struggle before birth between the two brothers, their antagonism due to the episode of the birthright and later to the subterfuge whereby Jacob secured his father's blessing, Esau's deadly hatred, the wanderer's dream and Jacob's fleeing to safety, his marriage with Laban's daughters, how his quiet life was disturbed and again he became a pilgrim; the vision of the wrestling angel, his reconciliation with Esau and subsequent arrival at Hebran, where his parents lived, with his twelve sons, fathers of the ten tribes of Israel, all these events can be read and read again without losing their interest. The resemblances throughout the careers of the patriarchs — brotherly strife, parental overfondness and the rest, only emphasize the human quality of the narrative.

After ten years, as the closing chapters of Genesis inform the reader, Jacob's favorite son, Joseph, became leading actor in the drama. In their anger at his airs of superiority, his brothers sell him to a band of Ismaelites, telling Jacob that a wild beast had devoured him. Later, as Canaan was visited by a severe famine, the sons were sent to Egypt to buy corn, Benjamin being retained at home, but Jacob was obliged to let him go with the rest, as Joseph had refused otherwise to release Simeon held as hostage. How Jacob heard on the second return of his sons from Egypt that Joseph was ruler, how he set out to meet him, with a retinue of 66 persons, 11 sons and their children, and how Joseph met him at Goshen, to be received later by Pharoah and assigned a residence "in the best part of the land, in the land of Rameses," complete a thrilling narrative. At that time, Jacob was 130 years of age. His death was the next great episode, but before his passing he made Joseph swear not to bury him in Egypt, but in the family sepulchre in Canaan. Then adopting Joseph's two sons, he blessed all his sons in solemn assembly, giving Joseph's younger son precedence over the elder and assigning to Joseph a portion more than his brothers. He was 147 at his death, his body being embalmed in Egyptian fashion. It was accompanied back to Canaan by an immense retinue including all the servants of Pharoah and all the elders of Egypt and was laid at rest in the cave of Machpelah at Hebron.

The story of Jacob, as can be said of the other patriarchs, h been attacked as unhistorical, a charge easily made, if not substantiated. It is, however, a source-book of evidence on marriage customs, pastoral occupation, belief and traditions of the people, which must have had a basis of fact to be related with such naturalness and simplicity. The olden rabbis in their popular expositions of the Bible or 'midrashim' realize their value for character building. Jacob is a favorite theme, and the homilies, however, apparently trivial at times, had their significance in keeping alive the study of Scripture. Much that seems obscure and of doubtful worth in the text receives fresh meaning. Take the story of the birthright, for example. Esau was fresh from the slaying of Nimrod and two of his companions, when he sold the birthright. In desiring it, Jacob wished chiefly its spiritual prerogatives. It is another opinion that Jacob wanted the birthright, because the first born was forerunner of the priest who offered the family sacrifices and he felt that Esau was not fit to bring offerings to God. How the Midrash enlarges upon Scripture is illustrated by the statement that Jacob gave three injunctions to his sons before his death. They should not worship idols, nor blaspheme the name of God, nor permit a pagan to touch his corpse. On each side of his coffin, three of his sons were to be stationed, just as the tribes were later gathered in the wilderness. Joseph's order to have Jacob's body embalmed was not regarded with favor, it seemed to indicate a limitation of divine power. For rabbinical legends in general, bearing on the Biblical characters, the reader will find Dr. Louis Ginzberg's 'The Legends of the Jews' (Phila. 1913), the latest and fullest authority.

ABRAM S. ISAACS.

JACOB BEN-CHAYYIM BEN-ISAAC IBN-ADONIA, Jewish author: b. Tunis about 1470; d. Venice about the middle of the 16th century. Soon after the year 1500 the Jews of Tunis were severely persecuted. He fled to Italy and lived in Rome, Florence and Venice. At Venice he found employment as proofreader on the Bamberg edition of the Rabbinic Bible which was prepared under the direction of Felix Pratensis. The second edition (4 vols., Venice 1524–25) was prepared by Jacob ben-Chayyim. It is noted for the amount of erudition displayed, especially in connection with the Masorah. It contains the text, with the Masorah, the Targums, the Commentaries of many Jewish scholars including his own.

JACOB TOME INSTITUTE, an institution of secondary education located at Port Deposit, Md. It was founded 1894 by Jacob Tome. When Mr. Tome's gift was made, only five other citizens of the United States — Stephen Girard, Anthony J. Drexel, Johns Hopkins, Charles Pratt and John D. Rockefeller — had made greater gifts to educational institutions. The endowment and other property of the school are estimated at more than $3,000,000. The Jacob Tome Institute was incorporated in 1889. The boarding school for boys, founded in 1900, is located on the hills overlooking the historic Susquehanna River. The grounds of the institute include about 160 acres. The principal buildings are Memorial Hall, erected in memory of the founder, two dormitories, gymnasium, the Inn, power plant and infirmary. The school consists of six classes, each requiring one year. The studies of the last three years are arranged in five groups which prepare students for college, technical schools, or for active business life. The institute confers no degrees, although a certain amount of collegiate work can be and is done in the regular courses. Students must be not less than 10 years of age in order to gain admission. Special scholarships are offered to boys from Maryland. There is also a kindergarten, junior school and senior school for girls.

JACOBEAN ARCHITECTURE. See ARCHITECTURE — RENAISSANCE PERIOD.

JACOBI, jȧ-kō'bi, **Abraham,** American physician: b. Hartum, Westphalia, 6 May 1830. He was educated at the universities of Greifswald, Göttingen and Bonn, and was graduated as M.D. from the latter in 1851. Those were years of revolutionary ferment in Germany and Jacobi, becoming identified with the movement, was imprisoned for "high treason" at Berlin and Cologne (1851–53). In 1853 he settled in practice in New York, where his abilities soon brought him into notice. He was appointed professor of diseases of children at the New York Medical College (1860–65) and held a similar chair in the medical department of the University of the City of New York (1865–70). Some years later he became professor of the diseases of children at the College of Physicians and Surgeons. He held many important appointments, and was president of the New York State Medical Society (1882); of the New York Academy of Medicine (1885–89); in 1896 was president of the Association of American Physicians and in 1912 president of the American Medical Association. In 1900 his 70th birthday was made the occasion of a public demonstration in his honor. Among his works are 'Dentition and its Derangements' (1862); 'Infant Hygiene' (1873); 'Diphtheria' (1880); 'Therapeutics of Infancy and Childhood' (1895); 'Aufsätze, Vorträge, und Reden' (1893); 'Collectanea Jacobi' (8 vols., 1909).

JACOBI, Friedrich Heinrich, German philosopher: b. Düsseldorf, 25 Jan. 1743; d. Munich, 10 March 1819. He was educated at the University of Geneva, and in 1764 entered upon a commercial career in his native town; after a few years he retired from business, and in 1770 became a member of the councils for the duchies of Juliers and Berg. From his university days he was actively interested in literature and philosophy, and with Wieland started a journal in which some of his own writings were first published. In 1779 he went to Munich for a short time; and in 1793 left Düsseldorf and settled in Holstein. In 1804 he was called to Munich as a member of the Academy of Sciences then newly established; from 1807 to 1812 he was president of the academy; and in 1812 retired to prepare a collected edition of his works, which, however, was not finished before his death. His writings include two philosophical romances, 'Allwills Brief-Sammlung' (1774) and 'Woldemar' (1779); and the more important philosophical treatises, 'Briefe über die Lehre Spinoza's' (1785); 'David Hume über den Glauben oder Idealismus and Realismus' (1785); 'Von den Göttlichen Dingen' (1811). In these treatises he defines his theory that man's thought — or reason — is by its nature partial and limited, and can only connect facts, not explain their existence; and that the higher truths must be understood through another different faculty which he calls "faith" or "belief" ("Glaube"); he does not, therefore, seek to establish a systematic philosophy. His theories involved him in considerable controversy, especially with the adherents of the critical philosophy. His collected works were published at Leipzig (6 vols., 1812–24). Consult Deycke, 'F. H. Jacobi im Verhältniss zu seinen Zeitgenossen' (Frankfort 1848); Wilde, 'F. H. Jacobi: A Study of the Origin of German Realism' (New York 1894); Crawford, 'Philosophy of F. H. Jacobi' (ib. 1905); and Isenberg, 'Der Einfluss der Philosophie Charles Bonnets auf F. H. Jacobi' (Tübingen 1906).

JACOBI, Herman Georg Jakob, German Sanskrit scholar: b. Cologne, 11 Feb. 1850. He was educated at Cologne Gymnasium, and later took up a course of studies in Sanskrit and allied languages at the universities of Bonn and Berlin. After spending a year (1872–73) in the India office in London on the old Sanskrit manuscripts, he went to India, making a tour of Rajputana. In 1875 he became a docent in Sanskrit at Bonn; from 1876–85 was professor extraordinarius of Sanskrit and Comparative Philology at Münster, Westphalia; in 1885 was made professor ordinarius of Sanskrit at Kiel; and in 1889 was appointed professor of Sanskrit at Bonn. He made a special study of Jainism and Prâkrit grammar, writing exhaustively on those subjects as well as on the Sanskrit poetical languages. Among the most important of his works are 'The Indian Antiquary' and the 'Epigraphia Indica,' published in 1892, in which he gives two sets of tables showing the Hindu dates in inscriptions, a work of much value. His other works include 'De Astrologiæ Indicæ, Horâ appellatæ originibus' (1872); 'The Kalpasûtra of Bhadrabâhu' (1879); 'The Âyaramgo Sutta of the Çvetâmbra Jains' (1882); 'Gaina Sûtras' (1884); 'Ausgewählte Erzählungen in Mâhârâshtri. Zur Einführung in das Studium des Prâhrit' (1886); 'The Porisishtaparvan by Hemachandra' (1891); 'Sthavirâvali Charita' (1891); 'Das Râmâyana Geschichte und Inhalt, nebst Concordanz der gedruckten Recensionen' (1893); 'Kompositum und Nebensatz, Studien über die indogermanische Sprachentwicklung' (1897); 'Bhasa's Svapnavasavadatta' (1913), etc.

JACOBI, Karl Gustav Jakob, German mathematician: b. Potsdam, 10 Dec. 1804; d. Berlin, 18 Feb. 1851. He obtained his education at the University of Berlin, where he studied especially mathematics and philosophy, later in 1824 becoming a privat-docent there. In 1825 he became assistant professor of mathematics at Königsberg and in 1827 was appointed professor. He was appointed a member of the Prussian Academy of Sciences in 1836 and from 1842 till his death in 1851 lectured at the University of Berlin. His most important work was on the theory of elliptic functions, but he also made some valuable contributions to the theory of numbers and determinants. Only a small portion of his writings and lectures were published during his lifetime and the greater part of these were published in the *Crelles Journal.* Among these are 'Fundamenta Nova Theoriæ Functionum Ellipticarum' (1829); 'Canon Arithmeticus' (1839); 'De Formatione et Proprietatibus Determinantium' (1841); 'Mathematische Werke' (1846–71). A complete edition of his works, 'Gesammelte Werke,' was published in seven volumes by the Berlin Academy of Sciences (1881–91). His 'Vorlesungen über Dynamik' did not appear till 1866, long after his death, and later in 1895, his essay, 'Uber die vierfach periodischen Functionen

Zweier Variabeln,' was published in Latin. Consult Königsberger, Carl Gustav Jacob Jacobi' (Leipzig 1904).

JACOBI, Mary Putnam, American physician: b. London, England, 31 Aug. 1842; d. New York City, 10 June 1906. She was graduated from the New York College of Pharmacy in 1862, from the Woman's Medical College of Philadelphia in 1864 and from the Ecole de Médecine of Paris in 1871. She then entered practice in New York, in 1881 was appointed clinical professor of the diseases of children in the New York Post-Graduate Medical School, where she lectured for three years. In 1874 she established an association for the promotion of the medical education of women, and became its president. In 1873 she was married to Abraham Jacobi (q.v.). She became a member of the American Medical Association, and published several works, including 'The Question of Rest for Women during Menstruation' (1877); 'Acute Fatty Degeneration of New Born' (1878); 'The Value of Life' (1879); 'Cold Pack and Anæmia' (1880); 'The Prophylaxis of Insanity' (1881); 'Common Sense Applied to Woman's Suffrage' (1894).

JACOBINS, jăk'ō-bĭnz, the most famous of the clubs of the first French Revolution. When the States-General assembled at Versailles in 1789 it was formed and called the Club Bréton. On the removal of the court and national assembly to Paris it acquired importance and rapidly increased. It adopted the name of Société des Amis de la Constitution, but as it met in a hall of the former Jacobin (Dominican) convent in Paris it was called the Jacobin Club. After the fall of the monarchy, in September 1792, it called itself Société des Jacobins, Amis de la liberté et de l'egalité. It gradually became the controlling power of the Revolution (see FRENCH REVOLUTION) and spread its influence over France, 1,200 branch societies being established before 1791, and obeying orders from the headquarters in Paris. Originally it was not particularly radical, either in its membership or in its political views. The former consisted chiefly of professional men of liberal ideas, some few liberal aristocrats like Louis Philippe, duc de Chartres, the duc d'Aiguillon, the prince de Broglie, the vicomte de Noailles, etc. Its large mass was made up of the *bourgeois*. Amongst its best known members were Mirabeau, Robespierre, David, Barnave, Pere Gerard, Abbé Grégoire, the two Lamells, etc. In the provinces the membership was much more democratic. Gradually its political tendencies became more and more radical and its more moderate members either resigned or were expelled, in many instances to form new political clubs, such as the Club of 1789, the Feuillants, etc. In the beginning the sessions of the Jacobins were secret, but in October 1791 they were thrown open to the public. For a while the Jacobins ruled supreme, and the Convention itself was but their tool. Robespierre (q.v.) was their most influential member; they ruled through him during the Reign of Terror, and were overthrown after his downfall in 1794. In that year the Convention forbade the affiliation of societies; the Jacobin Club was suspended and its hall was closed. Two or three attempts were made later, especially in the provinces, to revive the club, but they had only passing success. The term Jacobin is now often used to designate anyone holding extreme revolutionary views in politics. Numberless pamphlets were then published in regard to the Jacobins, the most noted being 'La Jacobinade,' 'Le secret des Jacobins' and 'Les crimes des Jacobins.' There is a very extensive literature on the Jacobins. Its proceedings were published as 'Journal des Amis de la Constitution' (4 vols., Paris 1793–95). The most authoritative work on the Jacobins is Aulard, F. A., 'La Société des Jacobins' (6 vols., Paris 1889–97), containing a very full bibliography. Consult Barrnel, A. de, 'Memoirs, Illustrating the History of Jacobinism' (4 vols., Hartford 1799); Dufay, P., 'Les Société Populaires et l'Armée, 1791–94' (Paris 1913); Farmer, J. E., 'Essays on French History' (New York 1897); Fribourg, A., 'Le Club des Jacobins en 1790' (in 'Revolution Française,' Vol. LVIII, p. 507, Paris 1910); Gros, J., 'Le Comité de Salut Public' (Paris 1893); Kuhlmann, C., 'On the Conflict of Parties in the Jacobine Club' (in *University of Nebraska Studies*, Vol. V, No. 3, p. 229, Lincoln 1905); id., 'The Relation of the Jacobines to the Army, the National Guard, and Lafayette' (ib. Vol. VI, No. 2, p. 153, Lincoln 1906); Mallet, G., 'La Politique Financière des Jacobins' (Paris 1913); Mortimer-Ternaux, M., 'Histoire de la Terreur d'apres des Documents Authentiques et Inédits' (8 vols., Paris 1862–81); Playfair, W., 'The History of Jacobinism, etc.' (2 vols., Philadelphia 1796); Schmidt, A., 'Tableaux de la Revolution Française, etc.' (3 vols., Leipzig 1867–69); Taine, H. A., 'The Jacobine Conquest' (in 'The French Revolution,' translated by J. Durand, New York 1881); Wallon, H., 'Histoire du Tribunal Revolutionair de Paris' (5 vols., Paris 1880); Zinkeisen, J. W., 'Der Jakobinerklub' (2 vols., Berlin 1852–53).

JACOBITE CHRISTIANS, a subdivision of the sect of the Monophysites (q.v.) comprising those who dwelt in Syria, Mesopotamia and Babylonia, organized by a certain Jacobus Baradæus, in the reign of Justinian, somewhat later than the middle of the 6th century. Jacobus had been a monk whose poverty-stricken asceticism gained for him the title of Jacobus Baradæus (Ragged James). He had been appointed bishop of Edessa in 541, and from that year to 578 he traveled round gathering the members of his heretical sect, until they formed a compactly ordered body which has survived to the present time. They now number about 80,000 and are governed by a Patriarch of "Antioch and all the East." Under him is the Maphrian, seven metropolitans and three bishops. There are many monks, from whose number the bishops are chosen. Consult Adeney, W. F., 'The Greek and Eastern Churches' (New York 1908); Assemani, 'Bibliotheca Orientalis' (Vol. II, Rome 1719); Bliss, F. J., 'The Religions of Modern Syria and Palestine' (New York 1912); Duval, R., 'La Litérature Syriaque' (Paris 1899); Kleyn, M., 'Jacobus Baradeus' (Leyden 1882); Krüger, G., 'Monophysitsche Streitigkeiten' (Jena 1884); Silbernagel, N., 'Verfassung der Kirchen des Orients' (Landshut 1865); Wright, G., 'History of Syriac Literature' (London 1894).

JACOBITES, a party in Great Britain (so styled from Lat. *Jacobus*, James), who after

the revolution in 1688 continued to be the adherents of the dethroned King James II, his descendants and, after the death of the last male representative (Cardinal York) in 1807 of the descendants of Charles I. Its members were chiefly, though not exclusively, Roman Catholics, its strongholds were Northumberland, North Wales and the Scottish Highlands. In Ireland they were soon put down by conquest. In England the revolution was accomplished with the apparent consent of all parties; but in a year or two the Jacobite party gained considerable influence and continued to disturb the government of William throughout his reign. After the accession of Anne and the death of James their efforts slackened for a time; but toward the close of her reign they revived. Bolingbroke and Oxford, with others of the Tory ministers of Anne, were in treaty with the son of James II, and either really or pretendedly negotiated for a restoration. On the arrival of George I in 1715 a rebellion broke out in Scotland, supported by a more insignificant rising in the north of England. The failure of both these movements dampened the enthusiasm of the English Jacobites, but in Scotland the party maintained its influence until the unsuccessful rebellion of 1745 put an end to its political importance, though some ultra-Jacobites did not think themselves justified in transferring their allegiance to the house of Brunswick till the death of Cardinal York in 1807. Even after that date sentimental Jacobitism had a certain amount of hold on a small group of people. It found expression in the formation of Jacobite societies, such as the "Cycle of the White Rose" in Wales, "John Shaw's Club" in Manchester and the "Order of the White Rose" with branches in England and the United States, the "Legitimist Jacobite League of Great Britain and Ireland," the "Thames Valley Legitimist Club," etc. Members of these associations consider the present British dynasty as usurpers and claim that the rightful occupant of the British throne is Marie Thérèse of Modena, now wife of Louis III, king of Bavaria, great-great-great-great-great-granddaughter of Henrietta of Orleans, daughter of Charles I. The hopes and wishes of the Scottish Jacobites found expression in many beautiful songs, which form an interesting feature of the national literature. These may be found in the following collections: Grosart, A. B., ed., 'English Jacobite Ballads' (Manchester 1877); Hogg, J., ed., 'The Jacobite Relics of Scotland' (Paisley 1874); Mackey, C., ed., 'Jacobite Songs and Ballads, etc.' (London 1861); Macquoid, G. S., ed., 'Jacobite Songs and Ballads' (London 1887). Many incidents in the history of the Jacobite party form the background of historical novels. The most important of these are Scott, Sir Walter, 'Waverley' (1814); id., 'The Black Dwarf' (1816); id., 'Rob Roy' (1817); Stevenson, R. L., 'David Balfour' (2 vols., 1886–92); id., 'The Master of Ballantrae' (1889); Thackeray, W. M., 'The History of Henry Esmond' (1852). An exhaustive list of the fictional treatment of Jabobitism will be found in Baker, A. E., 'A Guide to Historical Fiction' (London 1914). There is a vast literature on the subject which includes the large numbers of histories of famous Scottish families. Of other works on the subject consult Allardyce, J., ed., 'Historical Papers Relating to the Jacobite Period, 1690–1750' (Aberdeen 1895–96); Beamont, W., 'Jacobite Trials at Manchester in 1694' (in *Chetham Society*, Vol. XXVIII, Manchester 1854); Blaikie, W. B., 'An Itinerary of Prince Charles Edward Stuart' (Edinburgh 1897); id., 'Origins of the '45, etc.' (Edinburgh 1916); Carmichael, A., 'Some Unrecorded Incidents of the Jacobite Risings' (in *Celtic Review*, Vol. VI, pp. 278, 334, Edinburgh 1910); Forbes, J. M., 'Jacobite Gleanings' (Edinburgh 1903); Francillon, R. E., 'Underground Jacobitism' (in *Monthly Review*, London 1905); Gilbert, J. T., ed., 'Jacobite Narrative of the War in Ireland, 1688–91' (Dublin 1892); Grew, E. S. and M. S., 'The English Court in Exile' (London 1911); Hadden, J. C., 'Prince Charles Edward' (London 1913); Hale, E., 'James Francis Stuart, the Old Chevalier' (London 1907); Head, F. W., 'The Fallen Stuarts' (Cambridge 1901); Jesse, J. H., 'Memoirs of the Pretenders and their Adherents' (2 vols., London 1845); Klose, C. L., 'Memoir of Prince Charles Stuart, etc.' (2 vols., London 1845); Lang, A., 'Pickle the Spy, or the Incognito of Prince Charles' (London 1897); Mahon, Lord, 'The Forty-Five' (London 1852); Murdoch, W. G. B., 'The Spirit of Jacobite Loyalty' (Edinburgh 1907); Power, W., 'Prince Charlie' (London 1912); Ray, J., 'A Compleat History of the Rebellion' (York 1749); Rose, D. M., ed., 'Prince Charlie's Friends, or Jacobite Indictments' (Aberdeen 1896); Ruvigny, Marquis de, 'The Jacobite Peerage, etc.' (Edinburgh 1904); Terry, C. S., 'The Rising of 1745' (London 1900); id., ed., 'The Chevalier de Saint George and the Jacobite Movements in his Favour, 1701–20' (London 1915); Thomson, Mrs., 'Memoirs of the Jacobites of 1715 and 1745' (3 vols., London 1845–46); Thomson, J. P., 'The Jacobite Rebellions 1689–1746' (London 1914); Tulloch, A. B., 'The Forty-Five' (Inverness 1896); Vaughan, H. M., 'The Last of the Royal Stuarts' (London 1906); White, S. D., 'Revival of Jacobitism' (in *Westminster Review*, Vol. CXLVI, p. 417, London 1896).

JACOBITES, a Syrian Monophysite sect founded by Jacob Baradæus about 541. In his lifetime the sect numbered about 80,000 and persisted down through the Middle Ages. It became the national church of Syria. Early in the 19th century great numbers were converted to the Roman Church. The sect has a separate patriarch at Antioch and under him are eight metropolitans and three bishops. There are convents for men but there are no nuns. In ceremonial they differ but little from the Greek Church. Consult Bliss, F. J., 'The Religions of Modern Syria and Palestine' (New York 1912).

JACOBS, Henry Eyster, American Lutheran clergyman and theologian: b. Gettysburg, Pa., 10 Nov. 1844. He was graduated from Pennsylvania College (Gettysburg) in 1862, from the Lutheran Theological Seminary at Gettysburg in 1865, was professor of Latin and history in Pennsylvania College in 1870–80, of ancient languages in 1880–81 and of Greek in 1881–83. In 1883 he became professor of systematic theology in the Lutheran Theological Seminary and in 1894 dean, and in 1910 chairman of the faculty of that institution. He was president of the Board of Foreign Missions of the General Council of the Lutheran

Church (1901–07); president of the American Society of Church History' (1910–11); and president of the Pennsylvania German Society (1911–12). Besides writing several Bible commentaries, contributing to encyclopædias, translating and writing various German theological works, his publications include 'The Lutheran Movement in England' (1891); a 'History of the Lutheran Church in America' (1893); 'Elements of Religion' (1894); a 'Life of Martin Luther' (1898); 'The German Emigration to America 1709–40' (1899); 'Summary of the Christian Faith' (1906).

JACOBS, Joseph, Anglo-American author and journalist: b. Sydney, New South Wales, 29 Aug. 1854; d. 30 Jan. 1916. He was graduated from Saint John's College, Cambridge, traveled in Spain in 1888 and in the United States in 1896, was at various times editor of 'Folk Lore,' the 'Literary Year-Book' and the 'Jewish Year-Book,' was elected president of the Jewish Historical Society and became literary editor of the 'Jewish Encyclopædia' in New York in 1906. His publications include, besides translations and editions of English classics, 'Celtic Fairy Tales' (1891); 'Indian Fairy Tales' (1892); 'The Jews of Angevin England' (1893); 'Studies in Biblical Archæology' (1894); 'Literary Studies' (1895); and 'Jewish Ideals' (1896).

JACOBS, Michael, American Lutheran clergyman: b. near Waynesboro, Franklin County, Pa., 1808; d. 1871. He was graduated, in 1828, at Jefferson College, Canonsburg, and in the following year was appointed instructor at the Gettysburg Gymnasium. After 1832 he served as professor there and retired in 1865. In 1832 he entered the Lutheran ministry. He was a very versatile man; invented a method of preserving fruit and was a meteorologist of note. He published 'The Rebel Invasion of Maryland and Pennsylvania' (1863).

JACOBS, William Wymark, English novelist: b. London, 8 Sept. 1863. He was educated privately and at the age of 20 entered the civil service, Savings Bank Department, where he remained until 1899. His works deal mostly with the lives and passion of those who toil on the sea, they include 'Many Cargoes' (1896); 'The Skipper's Wooing' (1897); 'Sea Urchins' (1898); 'A Master of Craft' (1900); 'Light Freights' (1901); 'At Sunwich Port' (1902); 'The Lady of the Barge' (1902); 'Odd Craft' (1903); 'Dialstone Lane' (1904); 'Captains All' (1905); 'Short Cruises' (1907); 'Salthaven' (1908); 'Sailors' Knots' (1909); 'Ship's Company' (1911); 'Night Watches' (1914); 'The Castaways' (1916); (joint-author) 'Beauty and the Barge,' a play in three acts, produced in New York (1913).

JACOB'S CAVERN, a remarkable natural cavern near Pineville, McDonald County, Mo. It was discovered by E. H. Jacobs, and was named in his honor. The opening to the cavern is about 68 feet long and 45 feet deep. The height of the cavern varies from four feet to eight and one-half feet. The rock formation is stratified and is of limestone of the Subcarboniferous era. The floor is covered with a deep crust of ashes, in which were found flint knives, bone awls, hammer stones, human skeletons, and animal bones. Many of these relics are now in the Museum of Phillips Academy, Andover, Mass. Consult Gould, C. N. (in *Science*, 31 July 1903) and Peabody (in *American Anthropologist*, Sept. 1903).

JACOB'S WELL is situated near the ancient Sychar or Samaria, about two miles from the modern Nablus. It is not mentioned in the Old Testament, but is mentioned in the Gospel of John (iv, 6). The traditions of Moslems, Jews and Christians identify it with Bir Yakub or Jacob's Well. Here it was that Jesus had his remarkable conversation with the woman of Samaria. It is about seven feet six inches in diameter with a narrow mouth. Its depth has been variously estimated. Arculfus (A.D. 670) estimated it at 240 feet. Major Anderson measured it in 1866 and found it to be 75 feet. It is now the property of the Greek Church of Nablus and a hut has been built over the well and the surroundings improved. It is the site of several churches. The Crusaders built a church there which was destroyed soon after 1187.

JACOBSEN, Johan Adrian, Norwegian ethnologist and explorer: b. Risö, 1853. For seven years after 1867 he was member of a whaling crew on the Spitzbergen and Murman coasts. He traveled along the west coast of South America in 1876–77 and subsequently visited the Arctic regions, bringing back hundreds of ethnographical specimens. In 1881 he was engaged by the Berlin Museum für Völkerkunde to gather ethnographical and other specimens on the west coast of North America, also Korea, Japan, Siberia, the South Sea Islands, etc. He spent seven years in this work, collecting in all over 18,000 specimens. Subsequently he made collections in Germany and Norway. At the Columbian Exposition of 1893 he exhibited a marvelous ethnographical collection from 25 non-European peoples. These formed the nucleus around which has grown the Field Columbian Museum of Chicago. He has published 'Reise an der nordwestküste Amerikas' (1884); 'Eventyrlige farter' (1894); 'Reise in der inselwelt des Banda-Meeres' (1896).

JACOBUS, Melancthon Williams, American Presbyterian clergyman and educator: b. Allegheny, Pa., 15 Dec. 1855. He was graduated from Princeton in 1877, from the Princeton Theological Seminary in 1881, and after study of Göttingen and Berlin (1881–84), was pastor of the Presbyterian Church at Oxford, Pa., in 1884–91. In 1891 he became professor of New Testament exegesis and criticism in the Hartford (Conn.) Theological Seminary. He received the degree of D.D. from Lafayette College (1892) and from Yale University (1910). Besides editorial work on numerous theological standard texts, his Stone lectures at the Princeton Theological Seminary (1897–98) appeared as 'A Problem in New Testament Criticism' (1900).

JACOBUS BARADÆUS. See JACOBITES.

JACOBY, Harold, American astronomer: b. New York, 4 March 1865. On his graduation from Columbia University in 1885, he applied himself to astronomical research, and was appointed assistant astronomer United States eclipse expedition to West Africa (1889–90). He became professor of astronomy at Columbia in 1894 and an active member of the lead-

ing astronomical and scientific societies at home and abroad. His writings include numerous technical monographs in astronomical photography, stellar parallax and star clusters which have been published by French, English and Russian societies, frequent contributions to the periodical press on popular astronomy, and standard textbooks 'Practical Talks by an Astronomer' (1891); 'Astronomy, a popular handbook' (1913); 'Navigation' (1917).

JACOPONE DA TODI, Italian monk and poet: b. Todi, Umbria, about 1230; d. 1306. He took up the profession of the law and became a successful practitioner. His wife died in 1268 and immediately afterward he abandoned his profession, gave his property to the poor, and took up a life of penance, attacking from time to time the licentiousness of the age. In 1278 he became a lay brother of the Order of Saint Francis. He was one of the opponents of Boniface VIII, and when taken captive at Palestine in 1298, was thrown into prison, where he remained until the death of Boniface in 1303. Jacopone wrote several hymns, including the immortal 'Stabat Mater Dolorosa.' Consult Bruguali 'Fra Jacopone da Todi' (Assisi 1907); Macdonnell, 'Sons of Francis' (London 1902); Sorio, 'Poesie scelte di Fra Jacopone da Todi' (Verona 1859).

JACOTOT, Jean Joseph, zhŏn zhō-zĕf zhā-kō-tō, French educator: b. Dijon, 4 March 1770; d. Paris, 30 July 1840. He studied at the University of Dijon, became professor of Latin, then studied law and during the revolution was successively soldier, secretary to the minister of war, and deputy-director of the Polytechnic School, where he was also professor of mathematics. He was elected to the chamber of deputies in 1815, but was forced, after the second restoration, to leave France. He went to Brussels, in 1818 was appointed lecturer on the French language in the University of Louvain, and in 1827 director of the Military Normal School. He returned to France after the revolution of 1830. The fundamental principle upon which his system of education rests is that every person is able to educate himself, provided he is once started in the right way. Knowledge should first be acquired through instinctive experience, or by the memory. For example, in imparting a knowledge of a language, Jacotot began by making the pupil commit to memory a single passage; he then encouraged him to study for himself, first the separate words, then the letters, then the grammar, and lastly the full meaning and import. His steps were learn, repeat, reflect and verify. He expounded his views in 'Enseignement Universel' (Louvain and Dijon 1822) which has been translated into various other languages. It consists of five parts: 'Langue Maternelle'; 'Langue Etrangère'; 'Messigue, Dessin et Peinture'; 'Droit et Philosophie'; 'Mathematiques.' Consult Cornelius, B., 'An Account of M. Jacotot's Method of Universal Instruction' (London 1830); Guillard, A., 'Biographie de J. Jacotot' (Paris 1860); Kenaston, G. F., 'Educational Doctrines of J. J. Jacotot' (in *Education*, Vol. II, pp. 446, 564, Boston 1882); Payne, J., 'Lectures on the History of Education' (London 1892); Quick, R. H., 'Essays on Educational Reformers' (New York 1907); Seltzsam, C., 'Beiträge zur Würdigung der Jacototischen Methode' (Breslau 1848); Wurm, C. F., 'Hamilton und Jacotot' (Hamburg 1831).

JACQUARD, Joseph Marie, zhō-zĕf mä-rē zhä-kär, French inventor: b. Lyons, 7 July 1752; d. Oullins, near Lyons, 7 Aug. 1834. His parents were silk weavers, and he learned the same trade. After a long period of hardship, during which he shared in some of the campaigns of the Revolution, he made his name famous by the invention of his new loom, which was publicly exhibited at Paris in 1801 and patented 23 December of the same year. During the final work on his loom he enjoyed the support of Napoleon who had become interested in his inventive genius. He endeavored to introduce it into general use in Lyons, but was mobbed, and all but lost his life while his loom was ordered to be burned. Ultimately, however, his invention gained extensive use, he was granted a small pension by the French government, and was able to spend the latter part of his life in comfortable independence. In 1819 he was made a chevalier of the Legion of Honor. The subsequent prosperity of Lyons is largely attributable to his invention, and a more enlightened generation erected a statue to him in 1840 on the very spot where his loom was publicly destroyed. (See Loom). Consult Bell, T. F., 'Jacquard Weaving and Designing' (London 1895); Donat, F., 'Technologie der Jacquard-Weberei' (Vienna 1902); Du Saussois, A., 'Galerie des Hommes Utiles' (Paris 1875); Grandsard, A., 'Jacquard, sa Vie, etc.' (Paris 1869); Humphries, S., 'Oriental Carpets, etc.' (London 1910); Kohl, F., 'Geschichte der Jacquard Machine' (Berlin 1872); Lamartine, A. de, 'Memoirs of Celebrated Characters' (Vol. II, New York 1854); id., 'Jacquard-Gutenberg' (Paris 1864); Posselt, E. A., 'The Jacquard Machine Analized and Explained' (Philadelphia 1893).

JACQUARD MACHINE. See Damask.

JACQUE, Charles Emile, French painter: b. Paris, 1813; d. 1894. He gave his attention to wood-engraving and about 1846 turned his attention to genre painting. He excelled in depicting rural and family life, domestic animals, flocks and herds, etc. There remain from his hand a great number of vignettes engraved on wood and copper. Among his best-known canvasses are 'Basse-cour'; 'La sortie du troupeau'; 'Un Intérieur'; 'Poulailler' (1861); 'Un clos à Barbizon' (1863); 'Grand troupeau au pâturage'; 'L'Abreuvoir'; 'Le clair de lune' (1888). He was awarded a gold medal at the exposition of 1889. He was the last survivor of the great Barbizon school. He published 'Le poulailler, monographic des poules indigènes et exotiques' (1869).

JACQUEMART, Jules Ferdinand, French etcher: b. Paris, 1837; d. Nice, 1880. He studied painting and more particularly etching and exhibited for the first time at the Salon of 1861. Besides the remarkable series representing the works of Rembrandt, Franz Hals, Meissonier, etc., he also illustrated his father's 'Histoire de la porcelaine' and 'Histoire de la céramique'; also Barbet de Jouy's 'Gemmes et joyaux de la couronne,' and several portraits. At the exposition of 1878 he received the Grand Médaille for etching. He also executed over 100 watercolors, three of which are in the Metropolitan Museum, New York.

JACQUERIE, zhäk-ė-rē', the name given to the rising of the French peasantry in the 14th century after the battle of Poitiers. They committed great devastations and outrages — burning castles, murdering men and violating women — particularly in the northeast of France. They were at length quelled by the Captal de Buch and Gaston Phébus, count of Foix, who slaughtered 7,000 of them near Meaux. The term *Jacquerie* is derived from *Jacques Bonhomme,* a familiar epithet for a peasant. Consult Luce, 'Histoire de la Jacquerie' (Paris 1895).

JACTITATION. (1) An action to enjoin a false statement by the respondent that he or she is married to the petitioner. (2) An untrue statement which injures another. In both senses, the offense is punishable in English law by the high court of justice and by the ecclesiastical courts. In sense 1, it is often called "jactitation of marriage." (3) In Louisiana, an action for damages for slander of title brought by one in possession.

JADE, ya'de, or **JAHDE,** a bay of the North Sea on the coast of Oldenburg. It is about 70 square miles in extent and is very shallow. It was formed mostly by storm-floods from the 13th to the 16th century. The inlet is about 1½ miles wide and admits the largest vessels. On the west side of the inlet is the naval base of Wilhelmshaven.

JADE, a remarkably tough, compact, ornamental stone, of green to white color and vitreous lustre, used by the prehistoric peoples of Switzerland, Mexico, Alaska and other countries for axes, utensils and carvings. It is still highly prized in the East, especially in China and New Zealand. Jade is a general term including two distinct minerals, jadeite and the more common nephrite. Jadeite belongs to the pyroxene group and chemically is a soda-spodumene, easily fusible (at 2.5) and having a specific gravity of 3.3 to 3.35. Nephrite is a variety of amphibole identical with tremolite when of white color, or with actinolite when green, fusing much less easily (at 4) and with specific gravity of 2.95 to 3.0. Much information as to jade and implements made from it may be found in the publications of the Smithsonian Institution, especially a paper by S. Blondel, 'A Historical, Archæological and Literary Study of Jade,' in the annual report for 1876.

JADLOWKER, Herman, Russian tenor: b. Riga, 1879. His father destined him for a commercial career but in order to avoid it the youth fled to Vienna in 1894. Here he studied under Gänsbacher and in 1899 made his début in Kreutzer's 'Nachtlager von Granada' at Cologne. Subsequently he appeared at Stettin and Karlsruhe. The late Emperor, William II, offered him a five-year contract at the Berlin Opera House. He next appeared in Vienna and in 1910 appeared at the Metropolitan Opera House, New York. He returned to Berlin in 1912.

JADWIN, Edgar, American military engineer: b. Honesdale, Pa., 1865. He studied at Lafayette College, was graduated from West Point in 1890, was an assistant in government engineering in 1890–91 and again from 1893, in the Spanish-American War was successively major and lieutenant-colonel of the 3d United States Volunteer Engineers, and for a time commanded a battalion of this regiment in the sanitation of Matanzas, Cuba. Promoted captain in the corps of engineers, U. S. A (1900), he was appointed (1902) to direct all Pacific Coast fortification and river and harbor work south of San Francisco. From 1907–11 he was engaged on the Panama Canal, becoming lieutenant-colonel in 1913.

JAEGER, yā'gėr See GULL; SKUA.

JAEGERS, Albert, American sculptor: b. Elberfeld, Germany, 28 March 1868. He was educated in the public schools of Germany and the United States and in art was self-taught. Since 1890 he has been professionally engaged as sculptor. He executed statuary for the Buffalo and Saint Louis exposition; for the fine arts building, Saint Louis; the new custom-house, New York; also private monuments, busts and tablets in marble and bronze. He was commissioned by the United States government to erect the Baron von Steuben Statue for Washington; of which a replica was ordered and presented by Congress to William II, then Emperor of Germany, from whom Jaegers received a decoration. The sculptor's most recent commission was the execution of the Germantown monument. He is a member of the National Sculpture Society and of the National Institute of Arts and Letters.

JAEL, the wife of Heber the Kenite of Ancient Israel. The kings of Canaan under the leadership of Sisera oppressed Israel. Deborah and Barak were then judges. They rallied their hosts to throw off the oppressive yoke. The Canaanites were defeated in a pitched battle "in Toanach by the waters of Megiddo." Sisera escaped and in his flight asked hospitality from Jael. She gave him food and drink. Then she took a nail and a workman's hammer and after piercing his head through the temples, cut it off. Deborah in her song celebrating the victory commends Jael as "blessed above women."

JAÉN, Spain, capital of the province of the same name, on the slopes of the Jabalcuz Mountains, 40 miles southeast of Cordoba, on the Linares-Puente Genil Railway. The streets are narrow and irregular and it is surrounded by ancient Moorish fortifications all crowned by a Moorish citadel. It contains several fine old churches, and several palaces, art galleries and a library. Leather, soap, alcohol and linen are manufactured. Pop. 26,890.

JAÉN, Spain, a province in the southern part of the kingdom, bounded on the north by Cindad Real, east by Albacete, south and southeast by Granada, and west by Cordoba. Its surface is broken by the ranges of the Sierra Morena, the Sierra de Segura and the Sierra Cazoola. It is watered by the Guadilquivir and its affluents the Guadalimar, the Guadianamen and the Jaén. Copper, lead, iron, zinc and salt are found in considerable quantities. Lead is mined to the extent of 85,000 tons annually, much of the ore containing silver. The mountain regions are barren but the Guadalquivir valley is very fertile and produces cereals and olives. Jaén was a Moorish kingdom for a short time after the Moorish conquest, but the

kingdom was ended by Ferdinand III in 1246 after which it remained part of Castile. Pop. 526,710.

JAFFA, jăf'fa or yăf'fā (ancient JOPPA; Ar. *Yafa;* Heb. *Yapho,* beauty), Asiatic Turkey, in the western part of Palestine on the Mediterranean Sea, about 35 miles from Jerusalem. Jaffa is an old Phœnician town mentioned in several places in the Bible. It was the port of entry for Jerusalem and for several of the interior cities of Palestine. Here the cedars from Lebanon were landed and then carried overland for the building of the Temple in Jerusalem. The house where Simon the tanner lived, and where Saint Peter lodged, is still pointed out. In 1187 it was taken by Saladin, in 1191 by Richard I. In 1799 it was captured by Napoleon, who here put to death 1,200 Turkish prisoners. The narrow entrance to the harbor is extremely dangerous. The city is built on a high rocky coast, and presents today the same irregular arrangement of streets, and unattractive looking houses that it may have had hundreds of years ago. The remains of Roman fortifications and dwellings are in the vicinity. The old road to Jerusalem is extremely interesting; but a railroad, built in 1892, connects the city with Jerusalem. The chief exports are oranges (said to be the finest in the world), other fruits, soap, sesame, wine, oil, raw silk and nuts. The chief imports are sugar rice, lumber, cotton goods, petroleum, tobacco and silk goods. The city contains several mosques, a Franciscan monastery and a mission school. Some attempts have been made to establish colonies of Jews on land near Jaffa. Pop. about 45,000, which includes colonies of some 15,000 Jews cultivating an area of some 120,000 acres. They are mostly Russian Jews, some maintained by various Zionist societies, and others by the Jewish Colonization Association (founded by Baron E. de Rothschild). The colony maintains Hebrew schools, agricultural schools and experiment stations. There are also four German agricultural colonies in the Jaffa region. In the European War the British took Jaffa on 18 Nov. 1917. See WAR, EUROPEAN — TURKISH CAMPAIGN.

JAFFNA, Ceylon, town at the north end of the island. It contains an old Dutch church and an ancient Portuguese fort. It has a large important export trade; the imports are cotton, rice, sugar, petroleum, tobacco and lumber, the exports fruits, wine, oils, sesame and soap, oranges, etc. It is the seat of a government agent and district judge. In 204 B.C. it was taken by the Tamils whose rajahs held it till 1617, when they were ousted by the Portuguese. The latter were displaced by the Dutch in 1658. Pop. 45,000, mostly Mohammedans together with 8,000 Jews.

JAGANNATH, or JUGGERNAUT (Sanskrit, *Jagannâtha,* lord of the world, one of the names of Vishnu), called by the natives Puri, a town and celebrated temple of Hindustan, in the presidency of Bengal, province of Orissa, on the Bay of Bengal, 48 miles south of Kattack. The town derives all its importance from the temple. This, the most celebrated shrine in Hindustan, was completed in the 12th century, at an enormous expense. The worship of Jagannath, the God of the people, aims at a catholicity with every form of Indian devotion and at the incorporation therein of every Indian conception of God. The main street of the city, at the extremity of which the temple stands, consists entirely of religious structures built of stone. The gardens here produce the finest fruits in the province. The temple stands near the shore, in a waste, sandy tract, and appears like a shapeless mass of stone. The idol is a carved block of wood, with a hideous face, painted black, and a distended blood-red mouth, and is magnificently dressed. On festival days the throne of the image is placed on a high tower moving on wheels. Long ropes are attached to the tower, by which the people draw it along. The belief that devotees used to cast themselves headlong in front of this car to be crushed to death probably grew out of the accidental fatalities sometimes occurring. Every year pilgrims flock in crowds to the temple.

JAGELLONS. See POLAND, *History.*

JÄGERNDORF, Silesia, frontier town on the Oppa, 15 miles northwest of Troppau. It contains a castle of the Liechtenstein family, a church and technical schools. It carries on an active trade and has manufactures of cloth, woolens, linen and machinery. The town sufferred severely during the Thirty Years War and more than once witnessed conflicts between Prussia and Austria. Pop. 16,680, mostly Germans.

JAGERSFONTEIN (yā'gėrz-fŏn-tīn) **EXCELSIOR, The,** a name given the largest known diamond; found in the mine of the Jagersfontein Company, Orange Free State, South Africa, in 1893; weight, 971 carats; color, blue white.

JAGGERY, a coarse brown sugar made in the East Indies by the evaporation of the juice of several species of palms, chemically the same as cane-sugar. The sap which yields jaggery becomes by fermentation palm-wine, and from it arrack (q.v.) is distilled. Jaggery is consumed at home little or none of it entering commerce. See PALM.

JAGIČ, ya'gich, Vatroslav, Slavic philologist: b. Warasdin, 1838. He received his education at the University of Vienna; taught for some time at Agram and in 1870 was appointed professor of comparative philology at Odessa. Four years later he became professor of Slavic philology at Berlin and in 1875 founded there the *Archiv* für *Slavische Philologie.* He removed to Saint Petersburg in 1880, succeeding Sresnevski at the university there and in 1886 to Vienna as professor of Slavonic philology. He retired in 1908. He is a member of the Serbian and Cracow academies and of the Academy of Saint Petersburg. He published a very great number of works on the history, language and literature of the Slavs and edited the 'Slavic Philological Encyclopedia' (Saint Petersburg 1909 et seq.).

JAGOW, Gottlieb von, German Secretary of State for Foreign Affairs: b. 26 June 1863. Educated at the University of Bonn, he entered the diplomatic service in 1895. He first made his mark as private secretary to Prince Bülow, former Imperial Chancellor. He became Minister to Rome in 1907 and Ambassador in 1908. During the Turco-Italian war he conducted important negotiations with the Italian govern-

ment and, it is said, prevented a war between Austria and Italy at the time. He was recalled to Berlin and appointed foreign secretary on the death of Kiderlen-Waechter (q.v.) in 1913. A quiet, retiring and scholarly man, he was one of the worst speakers in the Reichstag. Both the former American and British ambassadors to Germany expressed their appreciation of his unfailing courtesy. According to Mr. Gerard ('My Four Years in Germany') von Jagow was forced out of office in November 1916 by an agitation against him on account of his lack of force in defending government policy in the Reichstag. On 4 Aug. 1914 the British Ambassador in Berlin was informed by von Jagow that Germany could not respect the neutrality of Belgium, which led to the entrance of Great Britain into the war on the same day. During his first year as American Ambassador in Berlin, Mr. Gerard endeavored to persuade the German authorities to conclude a "Bryan Peace Treaty" with the United States, to which von Jagow replied that, if Germany did so, he feared she would be "immediately asked to sign similar treaties with England, France and Russia."

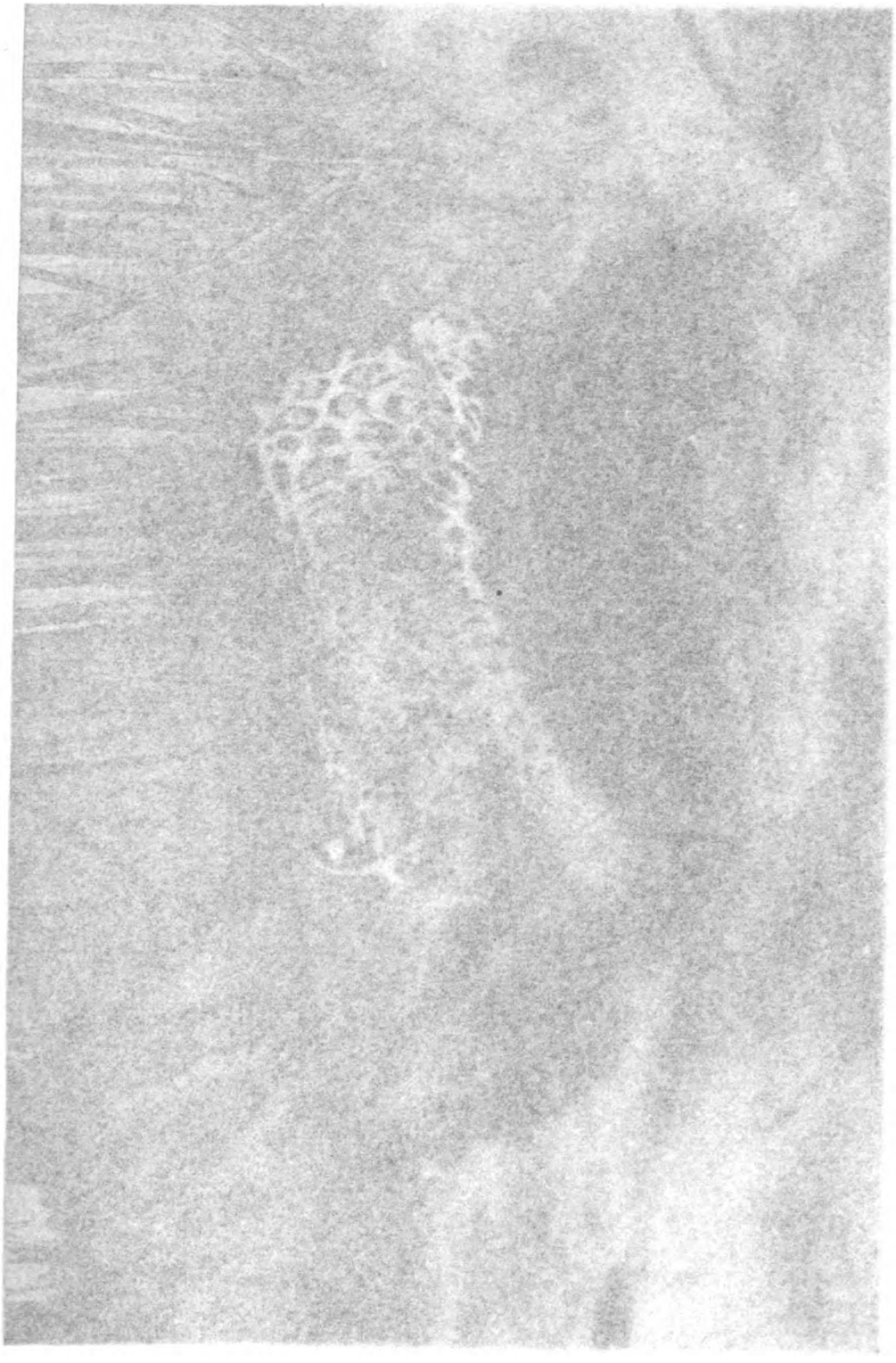
JAGUAR, jăg'ū-ăr or jăg'wär, a great American spotted cat (*Felis onca*), once numerous as far north and east as Arkansas, but since the early part of the 19th century rare even in Mexico. It resembles the leopard, but is more robust (exceeding the cougar in weight), has a rounder head, relatively shorter legs and a shorter, thicker tail. The tawny yellow hide is spotted with black, the spots larger than those of the leopard, and inclined to form broken rings with a spot in the centre. Jaguars abound in the tropical forests, especially along the great rivers, where they find most prey. They subsist largely on capybaras, agoutis, etc., but frequently pounce upon deer when they come down to drink. They seem to be more arboreal than most large cats, and a favorite method of obtaining their food is to lie along a tree-limb in some favorable spot and leap down upon the victim. But jaguars also abound in the treeless morasses of the Gran Chaco, and even on the dry uplands of Paraguay and Argentina, where their food and habits are entirely different from those that dwell in the forests. In view of the great extent of country and variety of circumstances in which this animal lives, formal statements as to its habits are rarely more than locally true; and much error and superstition encumbers popular accounts. In general the jaguar has the manners and disposition of other great cats, changing with environment, season and circumstances. It submits grudgingly to captivity, and gives the same reluctant submission to the training of the circus as is exhibited by other great cats. In some regions it is greatly feared by the people, while in other places it is regarded as little to be feared. Its greatest peculiarity, perhaps, is the tendency to terrific roars and cries, more loud and continuous than those of cougars or leopards. Consult the works of South American travelers and naturalists, especially Humboldt, Azara and Walterton. Their accounts are well summarized by Porter in 'Wild Beasts' (New York 1894). Consult also Bates, H. W., 'The Naturalist on the Amazon' (7th ed., London 1895); Hudson, W. H., 'The Naturalist in La Plata' (4th ed., ib. 1903); Wallace, A. R., 'Travels on the Amazon' (ib. 1889).

JAGUARONDI, jăg-wa-rŏn'dĭ, or **YAGUARONDI,** a slender, long-tailed, unspotted, blackish-gray wildcat (*Felis jaguarondi*) of tropical America. It is not common, and is little known. It measures about 30 inches from snout to tail, and the tail is 25 inches long; and the sides of its nose are curiously pinched in.

JAHDE. See JADE.

JAHN, Friedrich Ludwig, German patriot: b. Lanz, 11 Aug. 1778; d. Freyburg, 15 Oct. 1852. He was educated at Halle, Göttingen and Greifswald, paying special attention to theology and philology. He served for a time in the Prussian army and in 1809 removed to Berlin, where he became a teacher. To restore the morale of his young countrymen, then at its lowest ebb after the Napoleonic conquest, he hit upon the idea of practising gymnastics. The result was the first *Turnplatz,* opened in 1811, and which was soon attended by 1,000 of the youth of the German capital. Branches were soon formed in other cities, but the reactionary policy of the rulers in that day soon put an end to the movement, it being feared that it had a political or revolutionary significance. Jahn was arrested in 1819 and the *Turnplatz* suppressed. He was liberated in 1825, but was never after fully free and his remaining years were spent in comparative obscurity. The Turnvereine of present-day Germany is modeled closely on the designs of Jahn. In 1859 a monument was erected to his memory at Freyburg.

JAHN, Otto, German philologist: b. Kiel, 16 June 1813; d. Göttingen, 9 Sept. 1869. He was educated at Kiel, Leipzig and Berlin and subsequently traveled for three years in France and Italy. In 1839 he was appointed privatdocent at Kiel, and in 1842 removed to Griefswald as professor extraordinary of archæology and philology, becoming ordinary professor in 1845. He was called to Leipzig in 1847 to the chair of archæology but four years later he was deprived of his chair for having participated in the revolutionary movement of 1848–49. In 1855 he was called to the chair of the science of antiquity and to the directorship of the academical art museum of Bonn. He was called to succeed Gerhard at Berlin, but died before his installation there. His services to classical philology were immense as also in the field of classical archæology. His principal works are 'Palamides' (1836); 'Telephos and Troilos' (1841); 'Die Gemälde des Polygnot' (1841); 'Pentheus und die Mänaden' (1841); 'Paris und Oinone' (1844); 'Die hellenische Kunst' (1846); 'Peitho, die Göttin der Überredung' (1847); 'Ueber einige Darstellungen des Paris-Urteils' (1849); 'Die Ficoronische Cista' (1852); 'Pausaniæ descriptio arcis Athenarum' (3d ed., 1901); 'Darstellungen griechischer Dichter auf Vasenbildern' (1861). His critical editions of the classics include Juvenal, Persius and Sulpicia' (3d ed., 1893); 'Censorinus' (1845); 'Florus' (1852); Cicero's 'Brutus' (4th ed., 1877); Livy's 'Periochæ' (1853); Spuleius' 'Psyche et Cupids' (5th ed., 1905). Other works are 'Biographie Mozarts' (3d ed. by H. Disters, 1891; English trans., by P. D. Townsend, 1891); 'Ludwig Uhland' (1863);



SOUTH AMERICAN JAGUAR AND TAPIR

'Gesammelte Aufsätze über Musik' (1866); 'Biographische Aufsätze' (1866); 'Griechische Bilderchroniken' (1871). Consult biography by his nephew A. Michaelis (in 'Allgemeine deutsche Biographie,' Vol. XIII, Leipzig 1881) and Sandys 'History of Classical Scholarship' (Cambridge 1908).

JAI-ALAI. See PELOTA.

JAINISM, jīn'iz'm, is one of the many religions of India, followed by only about one million people, mostly in the northwest region. It closely resembles Buddhism, being a reaction contemporary with it in the 6th century B.C., from the precedent Brahmanism. These revolts arose from several causes: (1) the Kshatriya (warrior-caste) sought release from the religious domination of the Brahman (priest-caste); (2) Kshatriya philosophy rejected the Vedic deities; (3) the doctrine of non-injury. This last item gave to Jainism its outstanding trait. Softened by a tropical climate, humanized by a settled life in place of the old nomadic one, and driven by economy to abandon animal food, Indians had become increasingly reluctant to kill animals, except that the Brahmans naturally still demanded them for sacrifice. This practice was condemned by the Jains, who then proceeded with that extravagance characteristic of every Indian activity to spare all animal life whatsoever, even when noxious. To that end, the Jaina monk is equipped with a broom to sweep insects from his path, and a veil to sift them from his mouth, besides the inevitable almsbowl. Nor may he kill or disturb insects feeding upon his body. Moreover, Jains support beast-hospitals in many cities of western India, where old or lame buffaloes, cows, goats, sheep, fowl, and hordes of vermin are housed and fed.

Jainism was founded in the 6th century B.C., by Nataputta, entitled by his followers Mahavira (Great Hero) and Jina (Conqueror). The son of a chieftain, he led a worldly life until at 30, upon the death of his beloved parents, he was so agitated by the seriousness of life that he left his wife and relatives and wandered naked as a homeless ascetic. For 12 years he practiced the severest austerities with deep meditation, and was never moved to anger, though beaten by sinful men. Thus did he become the Jina (Conqueror) and Kevalin (Perfect Sage).

The Jaina monk attains deliverance for his spirit from the bonds of flesh by following the triratna (three jewels): knowledge, faith and virtue.

This knowledge teaches that the world consists of eternal spirits and eternal atoms, without any supreme being. Eight re-births, after becoming a Jaina monk will secure the spirit's release from matter; not for absorption into the absolute — as Brahmanism taught — nor for annihilation in Nirvana — as Buddhism taught — but for something beyond human speculation; so that the Jaina was termed "the may-be philosopher." Such agnosticism has never flourished among the credulous, imaginative Indians, who, moreover, lack the mental discipline afforded by science. The second jewel is faith which reposes in the word of their master, Mahavira, and the declarations of their scriptures, the Agamas. Virtue, the third jewel, consists of the five-fold conduct that results from such knowledge and such faith, namely: (1) to kill nothing whatever; (2) not to lie; (3) not to steal; (4) to abstain from sexual pleasures; (5) to renounce all the attachments of the senses. "What is discontent and what is pleasure? One should live subject to neither. Giving up all gaiety, circumspect, restrained, one should lead a religious life. Man! Thou art thine own friend; why lookest thou for a friend beyond thyself?"

Seven sects are classed as Svetambara (white-attire) in contrast with the Digambara (sky-attire) who migrated to the South where a more equable climate allowed them to make compulsory that nakedness which had been only recommended in the earlier texts. These may be the gymnosophists mentioned by Greek historians, but nowadays they merely doff their upper garments during meals. There are other Indian ascetics, however, who still discard clothing, and are generally countenanced.

This monk-regimen was much tempered for the Jains laity, who in fact, were mostly prosperous tradespeople, farming being prohibited by the non-injury doctrine. But, furthermore, this extension of Jainism to include laity introduced two important changes in the religion. First, to meet the religious needs of common folk, a worship of the founder, Jina, was instituted with temples, idols, festivals, and offerings of flowers and incense. Second, the monks were compelled to abandon their homeless wanderings, in order to care for the souls of their resident laity. This in turn, led to the erection of temples, the most costly and delicately beautiful in all India, as at Mount Abu, and the erection of cloisters where the leisured monks produced a varied literature. Thus does Nature, though expelled with a pitchfork, return in the end. Unlike Buddhists, the Jains maintain caste, some of them being even Brahmans.

Bibliography.— Jacobi, H., "Jaina Sutras" in Vols. 22 and 45 of 'Sacred Books of the East,' gives translation of various scriptures, and an excellent introduction. 'The Religions of India' by E. W. Hopkins, contains a section on Jainism and a bibliography of the numerous articles in various journals.

EDMUND BUCKLEY.

JAIPUR, or **JEYPORE,** India, city and native state of the Rajputana agency. The state has an area of 15,579 square miles; its centre is a sandy plain and to the east are ranges of hills. Irrigation systems are being constructed to relieve the water scarcity. Cattle are raised as also corn, wheat, barley, cotton, tobacco and sugar. Manufactures include cottons, statuary, pottery, brass and lacquer work. Copper, cobalt and marble are mined. The state was founded in 1128. Pop. 2,636,647. The city is 150 miles west of Agra, is fortified and is built mostly of pink stucco. It has wide, regular streets, and is the only city of India laid out in rectangular blocks. It contains the palace of the Maharaga, several colleges and an observatory. It was founded by Gai Singh II in 1728. The city has a large trade. Pop. 137,000.

JAIR, the name of several men mentioned in the Old Testament. The most important of that name judged Israel 22 years. He is said to have had 30 sons who rode on 30 ass colts.

Considerable discussion has arisen among commentators because of the attempt made to distinguish the Jair mentioned in the Hexateuch from the Jair of the book of Judges.

JAIRUS, the name of a certain ruler of a synagogue whose home was not far from Capernaum. He had a daughter 12 years old who became critically ill, lying at the point of death. He sought Jesus in order that he might exercise his healing power. Jesus at once accompanied the anxious father. Before the home was reached, a messenger met them announcing the child's death. When they arrived at the home, Jesus said "She is not dead but sleepeth." The professional mourners were sent from the room after ridiculing the statement. The parents and three disciples were detained. He then went to the bed, took the child by the hand and pronounced two Aramaic words "Talitha Cumi" or "daughter arise," and "she arose and walked."

JAJCE, yaĭ'tze, Bosnia, an historic town 62 miles by rail southeast of Sarajevo, occupying a hill overlooking the picturesque Pliva River where it falls 100 feet into the Vrbas River. A series of small lakes and cascades along the course of the Pliva through miniature gorges and tree-clad mountains, with the main fall at Jajce, are utilized for industrial purposes without detracting from the natural scenic beauties of the neighborhood. "The Lake Fort" or Turkish Djöl Hissar at Jezero, lies five miles west of Jajce. A 14th century fortress crowns Jajce hill. The 15th century church of Saint Luke with its fine Italian campanile is said to cover the traditional grave of the evangelist. In the church are preserved and exhibited the casket and skeleton of the last king of independent Bosnia, Stefan Tomašević, who was flayed alive by the Turks and beheaded in Kraljeva Polje, the "King's Field" just outside the walls. During the Moslem invasion of Europe in the 15th century, the districts of Jajce and Srebrenica, organized as the banate or Kingdom of Bosnia, and garrisoned by Hungarians, fiercely opposed the Turks as the outpost of Christendom. Bajazet II and his forces suffered a severe defeat from John Corvinus at Jajce in 1500, and resisted all attacks until the Hungarian power was overthrown at Mohacs in 1526. Two years later, after being besieged by the enemy during 65 years, Jajce surrendered and its fall consummated the Turkish conquest. Pop. 5,000.

JAKUTSK, a territory and town of Siberia, more frequently written Yakutsk (q.v.).

JALAL-ED-DIN MOHAMMED. See AKBAR.

JALAL-UD-DIN RUMI, Persian philosopher: b. Balkh, Khorasan, 1207; d. 1273. His father was a scholar and carefully educated the son, who also was educated at Aleppo and Damascus. In 1231 he was made director of a college at Konieh in Asia Minor. He gradually developed into a mystic. He founded an order of dervishes in 1247 for whom he wrote a collection of rules entitled 'Mathnawi.' The 'Diwan' is a lyrical collection of great poetic merit. This philosopher was the first to teach the transmigration doctrine. Consult Browne, 'Literary History of Persia' (New York 1906), and Davis, 'The Persian Mystics' (ib. 1908).

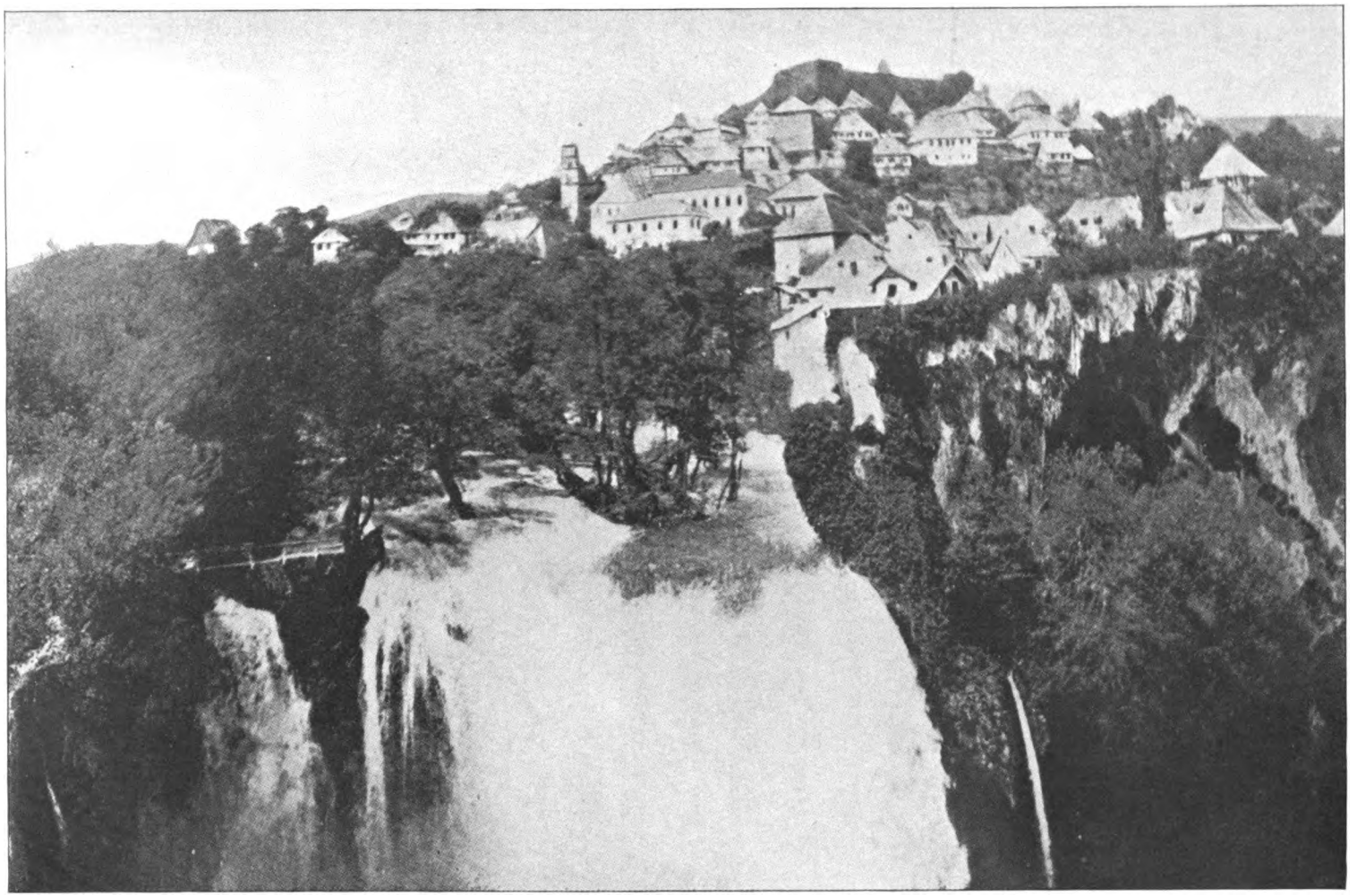
JALANDHAR, or **JULLUNDER,** British India, a division of the Punjab, which includes Kangra, Hoshiarpur, Jalandhar, Ludhiana and Firozpur. The area of the division is 19,394 square miles, with a population of 3,967,724. The capital is Jalandhar, situated 260 miles northwest of Delhi. It has flouring mills, iron and brass foundries, and silk mills, also public gardens and a military cantonment. Pop. 69,300.

JALAP (so called from Jalapa, or Xalapa, Mex., whence it is imported), the tuberous roots of several plants of the family *Convolvulaceæ,* that of *Ipomœa purga* being the most important. This is a twining herbaceous plant with cordate leaves and deep pink flowers, growing naturally on the eastern declivities of the Mexican Andes, at from 5,000 to 8,000 feet. The jalap of commerce consists of irregular ovoid dark-brown roots, varying from the size of an egg to that of a hazel-nut.

JALAPA, hä-lä'pä, or **XALAPA,** Mexico, on the Interoceanic Railway, capital of the State of Vera Cruz. Spelled Jalapa by the public generally, but Xalapa (meaning "five hills") always in official documents of the city itself and of the state of Vera Cruz. Elevation 4,689 feet above the sea. One of the oldest and most picturesque cities in the Republic. Distant from the city of Mexico by the Interoceanic Railway 350 miles, and from the city of Vera Cruz, 81 miles. Long before the coming of the Spaniards the town was a place of considerable importance, having been founded by the native Indians. It became a city in 1830, and the seat of the Bishopric of Vera Cruz in 1864. That it possesses very agreeable climatic qualities may be inferred from the fact that its average temperature the year round is 66° in the shade. There are several plazas, cotton mills, cigar manufactories and tanneries, a chocolate factory, a soda water factory and numerous small shops. The educational institutions are: Normal school, with a valuable chemical laboratory, physical and natural history collection, library, gymnasium and a corps of 20 professors and teachers, a female college, a school of fine arts, a preparatory college and primary schools. A few miles distant are the beautiful falls of Xico, which furnish the power for the city's electric lighting. There is the usual complement of churches; but the old convent of San Francisco, which dates back to 1555 and is now the Cathedral, is particularly interesting. Pop. about 25,000.

JALISCO, hä-lēs'kō, Mexico, a state bounded on the west by the Pacific Ocean, and on the north, east and south by the territory of Tepic and states of Durango, Zacatecas, Aquascalientes, San Luis Potosi, Guanajuato, Queretaro, Michoacan and Colima. The Sierra Madre range in the eastern portion of the state includes the active volcano Colima, the extinct Nevado and other high mountains. The largest river is the Santiago or Lerma. Chapala is not only the largest lake of Jalisco, but also of Mexico. The capital is Guadalajara (q.v.). Agricultural and manufacturing industries contribute to the state's wealth, supplementing in this respect the products of its mines. Area 31,846 square miles; population 1,220,160.

JAMAICA, from "Haymaca," a native Indian word signifying "island of fountains" or



JAJCE AND ITS WATERFALLS

more literally "well watered" the largest of the British West Indian Islands. It occupies the central position in the Antillean region, being nearly equidistant from Florida and the northern point of South America; from the mouths of the Orinoco and Galveston; from the head of the Gulf of Honduras, on the west, and Saint Thomas, on the east. Its greatest length is 144 miles; greatest breadth, 49 miles; area, 4,450 square miles. The eastern part of the island has, as its most commanding feature, the Blue Mountain range (highest peak 7,360 feet). The centre and west, an elevated plateau of later geologic formation, show the characteristic Antillean limestone and, more perfectly here than elsewhere in the West Indies, the extraordinary results of exposure of that soluble material to the tropical rainfall. This upland plain, by the action of the elements, has been carved into hills, basins, called "cock-pits," 500 feet or more in depth, and much larger and deeper valleys, in which the plantations are situated, and from which the numerous streams often find their way to the sea by underground passages. One of these depressions, the Clarendon Valley (drained through a cañon), is 25 miles wide and 50 miles long; another, Saint-Thomas-in-the-Vale, is circular in form, with a diameter of about 10 miles. Throughout the western half of the island such valleys occur, some with, others without, apparent drainage outlets. Coastal plains are most extensive on the south side, where the largest, the plain of Liguanea, has an area of 200 square miles. There are no navigable rivers, but a great number of small streams, pools and thermal springs. In the limestone region there are many caverns, interesting on account of their size, beauty, relics of the old Indian population. The mean temperature at the coast is very little more than 78° F.; that of the larger part of the habitable regions (1,000 to 3,000 feet above sea-level) is about 73° F.; and at the altitude of 5,500 feet it is 60° F. On the plateau the annual variation is scarcely 9°; for example, at Saint Elizabeth the maximum is 75° F. and the minimum 67° F. The average rainfall is 66 inches, the extremes being 100 inches on the high mountains and 44 inches at Kingston. The death rate is 20.9 in 1,000; but this favorable showing, as compared with the other islands of the Antilles, is due much less to natural advantages than to the strict enforcement of local sanitary and quarantine regulations. The population in 1916 was 904,681. The census of 1911 gave as the number of whites, 15,605; colored, 163,201; black, 630,181; East Indian, 17,380; Chinese, 2,111; not stated 2,905. The birth rate is little less than twice the death rate. The Jamaica negroes are fairly good laborers when well fed; the menial work of the island is performed by them, and they are regarded as cheerful, honest and respectful servants. They have no share whatever in the government.

Jamaica has no distinctively native mammals. There are many species of lizards, including the large iguana, a few harmless snakes and the slightly poisonous centipede and scorpion. In the lowlands mosquitoes, ants, sand-flies, butterflies, fireflies and beetles, parrots, pigeons, water-fowls and 20 different kinds of song-birds are common. Edible marine fish are seldom caught near the island, but the streams contain a few fresh-water species. The flora is distinguished from that of the other Antillean regions by the total absence of the royal palm, and by the abundance of pimentos, or allspice-trees, which are rarely found elsewhere. Common trees are the ceiba, mango, wild orange, cocoa-palm, plantain, fustic, logwood and cedar. Begonias, orchids, ferns and grasses abound, except on the southern coast, which has a flora of the arid type, including the cactus, thorny acacias and similar plants.

Agriculture and Transportation.— There were 1,012,128 acres under cultivation in 1916–17. Of this total 68,332 acres are devoted to pimento (allspice), but chiefly as a by-product on lands also used for stock-raising. Since the abolition of slavery the production of sugar has fallen off very greatly. In 1805 Jamaica exported 151,000 hogsheads of sugar, and 5,000,000 gallons of rum; in 1897 the cultivation of sugar-cane constituted only 19 per cent of the whole agricultural industry; in 1914–15 only 31,727 acres were under this crop. Other products have gradually taken its place. Since the great frosts in Florida (1895–96) the exportation of oranges from Jamaica has been carried on profitably; since 1886 tobacco has been grown and cigars for exportation made on a large scale. Coffee from the Blue Mountain estates is of fine quality. The cultivation of cacao has increased in recent years; ginger grows most readily in the rich soils on the mountain; and among the other exports may be mentioned lime-juice, tamarinds, nutmegs, a number of dyewoods and cabinet-woods. Special instruction in agriculture is given at the schools, and agricultural and horticultural interests are encouraged by the government and active private associations. The banana crop is increasing in importance, the average annual output reaching nearly 14,000,000 bunches, valued at about $5,800,000. The annual output of dyewoods is valued approximately at $440,000. The land is divided into small holdings, those of five acres and less numbering over 60,600 out of a total of 80,000 holdings. East Indian immigration was resumed in 1891, and since then large estates have been increasing in number. The soil is very fertile, being composed largely of sedimentary deposits from the white and red limestone formations which overlie the granite that forms the principal structure of the island. Agriculture is the chief industry, and nearly all others are dependent thereon.

The United States has the most important trade relations with Jamaica, furnishing a large part of the staple food supplies, and affording the best market for the island's fruit and sugar. Thus, in 1914–15, the total exports were valued at $14,522,665, the United States taking $8,847,310 in value; the United Kingdom $2,749,015, etc. Imports from the United States were valued at $6,105,755, and from the United Kingdom at $4,931,090. The total foreign business of the island in 1916–17 was $28,824,000, of which $15,084,000 came from imports and $13,740,000 from exports. There are 197½ miles of railway, 1,135½ of telegraph, including railway telegraph lines; 865½ of telephone lines; 18½ miles of electric and 8¼ of steam tramways. The system of public highways, extending into all parts of the island, is admirable; the roads are thoroughly well built and graded, have substantial bridges, and are kept in good

repair. The total tonnage of shipping, entered and cleared, in 1914–15 was 4,306,848, of which 2,240,429 were British. During the European war the British shipping with Jamaica fell off very greatly.

Government and Education.— The executive authority is vested in a governor, appointed by the king. He is assisted by a Privy Council and a Legislative Council (the governor, 5 ex-officio, 10 nominated and 14 elected members). For the administration of local affairs there are boards elected in each parish. Admittance to the lower grades of the civil service is gained through competitive examinations. The government medical service has in charge 18 public hospitals. The police system includes more than 100 stations in different parts of the island; a force of more than 1,500 men (769 district constables); several prisons, reformatories and industrial schools. There is a local artillery militia and rifle corps besides the garrison of regular troops. Fortifications and batteries are at Port Royal, Rocky Point, Salt Pond's Hill, Rock Fort, Fort Augusta, Fort Clarence and Apostles' Battery. The judicial department includes a high court of justice (nine members), circuit courts and a magistrate in each parish. Public revenue and expenditure in 1914–15, the last normal year during the European War, were $4,900,850 for the former, $5,274,845 for the latter; and the public debt was $3,854,305. Public elementary schools in 1916 numbered 696; average attendance, 65,302. There are four government training colleges for teachers; several endowed secondary, industrial and high schools; a public lyceum and museum, with a valuable library, etc. Local examinations are held on the island by the University of Cambridge. In 1870 the Church of England was disestablished and disendowed on the island.

The Cayman, Turks and Caicos Islands, and the Morant and Pedro Cays are attached to Jamaica for administrative purposes. Of these, the first group lies in the Caribbean Sea, 180 miles northwest of Jamaica, and comprises Grand Cayman, 17 miles long, 4 to 7 broad; Little Cayman, 9 miles long and about 1 mile broad; and Cayman Brac, 10 miles long and 1¼ miles broad. The government is administered by a commissioner and magistrates are appointed by the governor of Jamaica. The population of the Cayman Islands is about 5,930. The second group, Turks and Caicos Islands, situated nearly 500 miles northeast of Jamaica, geographically belongs to the Bahamas; but the governor of Jamaica exercises a supervising power over the local authorities (a commissioner and legislative board of 5 members). Area, 165½ square miles; population, 5,615; capital, Grand Turk; products, salt, sponges, pink pearl, etc. The Morant Cays and Pedro Cays are situated, respectively, about 33 miles southeast and about 45 miles southwest of Jamaica.

Kingston, the capital, had in 1917 59,288 inhabitants, a good water-supply and system of sewerage, well-lighted streets, large shops and a street railway. The town is, however, unattractive. Residences of the officials and wealthy merchants are built in the suburbs. Public institutions are the museum, library, colonial offices, schools, churches, almshouse, penitentiary, asylum and Victoria market. Four miles away is the important naval station of Port Royal, headquarters for the British West India naval forces, and a strongly-fortified place. Spanish Town, population 7,119, at one time the capital, is situated 15 miles west of Kingston. Port Antonio, on the northeast side of the island; Montego Bay, population 6,616; Savanna-la-Mar, Falmouth, Lucea, Saint Ann's Bay, Buff Bay, Port Morant, Black River, etc., are distributed among the three counties of Surrey, Middlesex and Cornwall.

History.— Jamaica was discovered by Columbus 3 May 1494; and he named it Saint Iago; but this designation was only used by the Spaniards; and was soon abandoned even by them in favor of the native name. As a Spanish colony (1509–1655) Jamaica was backward and of little consequence. The total population in the year last mentioned, when an English fleet sent out by Cromwell captured it, was only 3,000. One-half of that number took refuge in Cuba. Until the restoration of the English kings Jamaica was under military jurisdiction; but it was given a civil government under an executive council in 1661. Nine years later England obtained a clear title to Jamaica by the Treaty of Madrid: The settlers who arrived subsequently were peasants from Scotland, Ireland and England, English subjects from the other West Indian islands and Jewish traders from Minorca. Negroes were brought from Africa in great numbers; the old town of Port Royal being chosen as a convenient point from which to reship slaves to the other islands and the mainland. That town, once a place of great wealth and importance, was ruined by repeated calamities. "On 7 June 1692 happened that earthquake which swallowed up a great part of Port Royal," says Edwards, who explains that the town "was chiefly built on a bank of sand, adhering to a rock in the sea, and a very slight concussion, aided by the weight of the buildings, would probably have accomplished its destruction." Hurricanes in 1712 and 1722, and a conflagration 13 July 1815, completed the work of obliteration. During the 18th century the island suffered from many slave insurrections and uprisings on the part of the "maroons," descendants of Spanish African slaves inhabiting the mountainous districts and inaccessible places. Toward the close of the 18th century the island was occupied by large plantations and was exceedingly productive. Before that time 610,000 slaves had been landed at Port Royal. The freeing of the negroes resulted in the abandonment of the island by many landlords. In August 1903 a hurricane inflicted great injury at several points in Jamaica and on the Cayman Islands. On 14 Jan. 1907 Jamaica was visited by a disastrous earthquake which ("in ten seconds," Treves says) almost entirely destroyed Kingston.

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Library, 'List of Works Relating to the West Indies' (New York 1912); Phillips, U. B., 'A Jamaica Slave Plantation' (New York 1914, repr. *Amer. Historical Rev.*, Vol. XIX, No. 3); Treves, F., 'The Cradle of the Deep' (London 1908).

MARRION WILCOX.

JAMAICA, N. Y., a part of the borough of Queens in the city of New York, since 1 Jan. 1898; an important junction on the Long Island Railroad. Prior to its incorporation in Greater New York, Jamaica was the county-seat of Queens County, on Long Island. The town was settled as early as 1656. Several houses built before the Revolutionary War are in a good state of preservation. In the vicinity market gardening is carried on extensively. One of the New York State normal schools is situated in Jamaica.

JAMAICA BAY, New York, an inlet of the Atlantic Ocean which indents the southeast shore of Long Island. It is nearly circular in shape; the Rockaway Beach extends across the side toward the ocean and makes of the bay a land-locked body of water. A number of islands are in the middle and at the entrance. The whole of the bay, except an inlet, Head Bay on the east shore, is within the limits of New York city; Coney Island is near the entrance to the bay.

JAMBLICHUS, another spelling of Iamblichus (q.v.).

JAMES, Saint, called the "GREATER," the son of Zebedee. He was called to be an apostle, together with his brother Saint John, as they were mending their nets with their father, who was a fisherman. They then followed Christ, were witnesses with Saint Peter of the transfiguration, and accompanied our Lord in the garden of Gethsemane. In the lists of the apostles given in the synoptic Gospels and in the Acts the names of Peter, Andrew, James and John stand first; and it is plain that these four were at the head of the 12 throughout. After the ascension Saint James persevered in prayer with the other apostles and the women and the Lord's brethren. Nothing further is certainly known of him till the passover of 44, when, being in Jerusalem, the Jews stirred up Herod Agrippa I against him, who put him to a cruel death. Thus Saint James was the first of the apostles who suffered martyrdom. There is a legend that he went to Spain, and that his bones lent miraculous aid to the Spaniards against the Saracens.

JAMES, Saint, called the "LESS," an apostle, the brother or cousin of Jesus. He is called in Scripture the "Just," and is probably the apostle described in Matt. x, 3, and elsewhere as the son of Alpheus. He was the head of the church in Jerusalem when the Scribes and Pharisees threw him down from the gable of the temple, and a fuller dashed out his brains with a club, about the year 62. This is the account of his death given by Hegesippus, a Christian of Jewish origin, who lived in the middle of the 2d century, and it differs somewhat from the narrative of Josephus. Some critics maintain that James, the son of Alpheus, was one person, and James, the brother of Jesus, another. Whether James was the author of the epistle which bears his name is considered doubtful.

JAMES I, king of England, and VI of Scotland, the only child of Mary, Queen of Scots, by her cousin Henry Stuart, Lord Darnley: b. Edinburgh Castle, 19 June 1566; d. palace of Theobalds, Hertfordshire, 27 March 1625. In 1567 he was solemnly crowned at Stirling, and from that time all public acts ran in his name. His childhood was passed during civil wars, under the regencies of Murray, Mar and Morton, during which time he resided in Stirling Castle under the tuition of the celebrated Buchanan. From the first he seems to have imbibed those exalted notions of the royal authority and divine right which proved so injurious to his posterity. But James soon found it advisable to ally himself with Queen Elizabeth and to accept a pension from her. When, however, it became apparent that the life of his mother was in danger from the sentence of an English judicature, James sent representatives to England to intercede with Elizabeth; but his whole procedure in the matter shows a singular callousness. As a matter of form he ordered the clergy to pray for his mother, but when the news of Mary's execution arrived James was not much moved, though he attempted to make a show of indignation by condemning one of the commissioners to death, a sentence which, however, he commuted to banishment. On 23 Nov. 1589 James married Anne, daughter of Frederick II, king of Denmark. On his return home, after passing the winter in festivities at Copenhagen, he was in some danger from the unruliness of the nobles; and for several succeeding years of his reign the history of Scotland displays much turbulence and party contest, but the supremacy of the Crown was finally vindicated. In 1603 James succeeded to the crown of England, on the death of Elizabeth, and proceeded amidst the acclamations of his new subjects to London. One of his first acts was to bestow a profusion of honors and titles on the inhabitants of both countries. At a conference held at Hampton Court between the divines of the Established Church and the Puritans, James exhibited the ill-will he bore to popular schemes of church government. The meeting of Parliament also enabled him to assert those principles of absolute power in the Crown which he could never practically maintain, but the theoretical claim of which provided the increasing spirit of freedom in the House of Commons with constant matter of alarm and contention. Although James had behaved with great lenity to the Catholics in Scotland, those in England were so disappointed in their expectations of favor that the famous gunpowder plot was concerted in 1605, the object of which was to blow up the king and Parliament. (See GUNPOWDER PLOT, THE). In 1612 he lost his eldest son Henry, a prince of great promise, then 19; and in the following year the eventful marriage of his daughter Elizabeth with the Elector Palatine took place. No circumstance in the reign of James was more unpopular than his treatment of the celebrated Sir Walter Raleigh (q.v.). James had set his heart on marrying his son Charles to a Spanish princess, but the negotiations failed through the overbearing temper of Buckingham, the royal favorite, who quarreled with the grandees of the Spanish court. The close of the life of James was marked by

violent contests with his Parliament. He was also much disquieted by the misfortune of his son-in-law, the Elector Palatine, who, having been induced to accept the crown of Bohemia, and to head the Protestant interest in Germany, was stripped of all his dominions by the emperor. Urged by national feelings for the Protestant cause, he was at length (10 March 1624) induced to declare war against Spain and the emperor; and troops were sent to Holland to act in conjunction with Prince Maurice. James was not destitute of abilities nor of good intentions, but the former were not those of a ruler, and he was neither beloved at home nor esteemed abroad. He received during his lifetime a great deal of adulation on the score of his literary abilities, and to him the authorized version of the Bible (1611) is inscribed. He was aptly described by Sully as "the wisest fool in Christendom." Consult Aikin, 'Memoirs of the Court of King James the First' (1822); Burton, 'History of Scotland' (1873); Macaulay, 'History of England' (1858); Gardiner, S. R., 'History of England' from the Accession of James I to the Spanish Marriage' (1863–69); id., 'The First Two Stuarts' (1876); Henderson, T. F., 'James I and VI' (1904); and 'Cambridge Modern History' (Vol. III, 1910).

JAMES II, king of England, second son of Charles I and of Henrietta of France: b. London, 15 Oct. 1633; d. Saint Germain, France, 16 Sept. 1701. He was at once declared Duke of York, though only formally raised to that dignity in 1643. At the Restoration in 1660 he took the command of the fleet as lord high-admiral, and was also made warden of the Cinque Ports. He had previously married Anne, daughter of Chancellor Hyde, afterward Lord Clarendon (q.v.). In March 1671 the Duchess of York died. Before her death she declared herself a convert to the Roman Catholic faith, which had been secretly that of the duke for many years, and was now openly avowed by him. This declaration laid the foundation of the opposition which finally drove him from the throne. A test act being soon after passed, to prevent Roman Catholics from holding public employments, the duke was obliged to resign his command. On 21 Nov. 1671 he married Mary Beatrice of Este, daughter of the Duke of Modena, and in 1677 his eldest daughter, Mary, was united to William, Prince of Orange.

On the death of Charles II, 6 Feb. 1685, the duke succeeded, under the title of James II, and from the time of his ascending the throne seems to have acted with a steady determination to render himself absolute and to restore the Roman Catholic religion. At variance with his Parliament, he was under the necessity of accepting a pension from Louis XIV. He sent an agent to Rome to pave the way for a solemn readmission of England into the bosom of that Church, conduct which encouraged the rebellion of the Duke of Monmouth (1685). The unrelenting temper of James was again exhibited in the executions on this account. The legal proceedings under Jeffreys were brutal in the extreme; and no fewer than 320 persons were hanged on the western circuit alone, which attained an unenviable notoriety as the Bloody Assize. The New Netherlands (which included the city of New York) had been granted to him by Charles II, and his subserviency to the French King was seen in the Treaty of Neutrality agreed on in 1686 governing the relations of their American colonies. James gradually proceeded to a direct attack on the Established Church by the formation of an ecclesiastical commission, which cited before it all clergymen who had done anything to displease the court. Apparently to conciliate the Puritans a declaration of indulgence in matters of religion was ordered to be read by the clergy in all the churches of the kingdom, but its real object, however, was to favor the Roman Catholic element. Seven bishops met and drew up a loyal and humble petition against this ordinance, and for this act they were sent to the Tower, on a charge of seditious libel. On 29 June 1688, not many days after the birth of his son, the Old Pretender, they were acquitted amid the most enthusiastic rejoicings of the populace. The innovations, in regard both to the religion and government, gradually united opposing interests, and a large body of nobility and gentry concurred in an application to the Prince of Orange, signed by seven of the most prominent and influential political leaders, to occupy the throne. James, who was long kept in ignorance of these transactions, when informed of them by his minister at The Hague, was struck with terror equal to his former infatuation, and immediately repealing all his obnoxious acts, practised every method to gain popularity. All confidence was, however, destroyed between the king and the people. William arrived with his fleet in Torbay 5 Nov. 1688, and landed his forces, amounting to 14,000 men. Several men of rank went over to William, and the royal army began to desert by entire regiments. Incapable of any vigorous resolution, and finding his overtures of accommodation disregarded, James resolved to quit the country. He repaired to Saint Germain, where he was received with great kindness and hospitality by Louis XIV. In the meantime the throne of Great Britain was declared abdicated, and was occupied, with the national and parliamentary consent, by his eldest daughter, Mary, and her husband, William, conjointly; Anne, who had equally with her sister been educated a strict Protestant, being declared next in succession, to the exclusion of her infant brother, known in history as the Pretender, who had been born on 10 June of that year. Assisted by Louis XIV, James was enabled, in March 1689, to make an attempt for the recovery of Ireland. The result of the battle of the Boyne, fought 1 July 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive. Before his death he underwent a spiritual transformation, and died in the odor of sanctity. Consult Acton, 'Lectures on Modern History' (1906); Burnet, 'History of the Reign of King James the Second'; Cavelli, 'Les derniers Stuarts à Saint Germain-en-Laye' (1871); Fea, 'James II and his Wives' (1908); Klopp, 'Der Fall des Hauses Stuart' (1875–88), and 'Cambridge Modern History' (Vol. IV, 1911).

JAMES I, king of Scotland, of the house of Stuart: b. Dunfermline, 1394; d. Perth, 21 Feb. 1437. He was the son of Robert III. In

1406, while on his way to France, he was taken by the English and carried to the Tower of London. For the next 18 years he remained a prisoner in England, being confined during part of his captivity in Nottingham Castle, Evesham, and Windsor Castle, where he wrote the 'King's Quhair' and other poems. Robert III died very shortly after learning of his son's captivity, and James was proclaimed king; but during the remainder of the reign of Henry IV and the whole of that of Henry V, he was detained in England, with a view to prevent the alliance of Scotland with France. In 1424, under the regency of the Duke of Bedford, he was restored to his kingdom, at which time he was in his 30th year. Previous to his departure he married Jane or Joanna Beaufort, daughter of the Earl of Somerset, a lady of the blood royal of England, who is the fair dame alluded to in his poem 'The King's Quhair.' On his return to Scotland he restored Scotland to some degree of order, but so severe was his treatment of his turbulent nobles that he was at last murdered by their emissaries at Perth in the 13th year of his reign. His works, edited by Skeat, were published by the Scottish Text Society (1884).

JAMES II, king of Scotland, son of James I: b. 16 Oct. 1430; d. Roxburgh, Scotland, 3 Aug. 1460. During the minority his kingdom was distracted by struggles for power between his tutors Livingston and Crichton and the great house of Douglas. In 1449 he assumed the government and married Mary of Guelderland. He had latterly allied himself with the Douglases, but being deprived of all real power, he resolved to free himself from their yoke. This he did in 1452 by inducing the Earl of Douglas to come to Stirling Castle, where he stabbed him with his own hand. He then quelled a powerful insurrection headed by the next earl, whose lands were confiscated. In 1460 he infringed a truce with Henry VI of England by besieging the castle of Roxburgh, and was killed by the bursting of a cannon in the 29th year of his age.

JAMES III, king of Scotland, son of James II: b. 10 July 1451; d. 11 June 1488. He was crowned at Kelso on his father's death, but in 1465 came under the influence of Bishop Kennedy and the Boyd family, one of the latter espousing the king's sister in 1467. James married Margaret of Denmark in 1469, and dismissed the Boyds from favor only to advance other favorites. Prominent among these was Cochrane, through whom one brother of James was obliged to flee the kingdom, and another was put to death. The nobles seized Cochrane and five others and hanged them. Subsequently a plot was formed to dethrone the king, and though many peers remained loyal to him the royal army was defeated at Sauchieburn near Stirling. James escaped from the field, but was murdered during his flight.

JAMES IV, king of Scotland: b. 17 March 1473; d. Flodden, 9 Sept. 1513. He was the son of James III. He commanded the nobles who vanquished and killed his father at Sauchieburn, and was crowned at Scone in June 1488. He married Margaret, the daughter of Henry VII of England, but taking umbrage at the hostile attitude of his brother-in-law, Henry VIII, allied himself with France. He was defeated and slain at the battle of Flodden (q.v.) during an invasion of England.

JAMES V, king of Scotland, son of James IV: b. Linlithgow, Scotland, 10 April 1512; d. Falkland Palace, 14 Dec. 1542. He came to the throne under the regency of his mother in 1513 and assumed the reins of government in 1528. He married Madeleine of France in 1537, and on her death married the daughter of the Duke of Guise, Mary of Lorraine, in 1538. He ruled with much vigor and decision, and on account of his mingling freely with his people was called "the king of the commons." Becoming entangled in war with England in 1542, he was defeated at the battle of Solway Moss and died a month later. He was succeeded by his daughter, Mary, Queen of Scots, who was but seven days old at his death.

JAMES (JAMES FRANCIS EDWARD STUART), Prince of Wales, styled James III by the Jacobites and the Old Pretender by the Hanoverian party, and son of James II, king of England. See STUART, JAMES FRANCIS EDWARD.

JAMES, Bushrod Washington, American oculist: b. Philadelphia, 25 Aug. 1836; d. 1903. Graduated from the Homœopathic Medical College of Pennsylvania in 1857, he became well known as a practitioner; he was elected president of the Pennsylvania Homœopathic Medical Society in 1873, of the American Institute of Homœopathy in 1883, and in 1896 was vice-president of the Homœopathic Medical Congress held at London, England. His publications include 'American Climates and Resorts' (1889), a manual of climatology (1889); 'Alaskana' (1892); 'Echoes of Battle' (1895), and 'Alaska: Its Neglected Past and its Brilliant Future' (1897; rev. ed. 1901).

JAMES, Daniel Willis, American merchant and philanthropist: b. Liverpool, England, 1832; d. 1907. He came to America in early life and engaged in commercial life with the firm of Phelps, Dodge & Co., of New York. He amassed a huge fortune which he distributed to a great number of public institutions and seats of learning. Among the institutions which benefited from his philanthropy were Union Theological Seminary, $1,000,000; Amherst and Oberlin colleges, Columbia University, Cathedral of Saint John, New York, and the Hartford Theological Seminary. Under the terms of his will $100,000 was left to each of the following: Columbia, Yale, Union Theological Seminary, Cooper Union, Amherst College, American Board for Foreign Missions, Children's Aid Society, Cathedral of Saint John, New York, Presbyterian Hospital, New York. To Madison, N. J., he gave a library, assembly hall and public park.

JAMES, Edmund Janes, American educator and author: b. Jacksonville, Ill., 21 May 1855. He was educated at Illinois State Normal School, at Northwestern and Harvard universities, and received the degrees of A.M., Ph.D., University of Halle, 1877; and of LL.D., Cornell College, Iowa, 1902; Wesleyan, 1903; Queen's College, 1903; Harvard, 1909; Michigan, 1914, and Northwestern 1914. After scholastic positions at Evanston and Normal, at the universities of Pennsylvania and of Chicago, instructing in political and social science,

he was president of Northwestern University 1902–04, and since 1 Sept. 1904 president of the University of Illinois. He is a member of numerous learned societies, the author of a great number of miscellaneous articles in scientific journals and of the following works: 'Relation of the Modern Municipality to the Gas Supply' (1886); 'The Legal Tender Decisions' (1887); 'The Canal and the Railway' (1890); 'Federal Constitution of Germany' (1890); 'Federal Constitution of Switzerland' (1890); 'Education of Business Men in Europe' (1899); 'Charters of City of Chicago' (1900); 'Growth of Great Cities in Area and Population' (1900); 'Government of a Typical German City — Halle' (1900); 'The Land Grant Act of 1862' (1910); 'A National Economic Program' (1916); 'A Naval Program' (1916).

JAMES, Florence, "FLORENCE WARDEN," English novelist: b. Hanworth, Middlesex, 16 May 1857. She taught as a governess, 1875–80, and was on the stage, 1880–85. Her novels, many of which are strongly sensational in character, have been very popular in this country as well as in England. They are published under the pseudonym of "Florence Warden," and among them are 'At the World's Mercy'; 'The House on the Marsh,' which established her reputation; 'A Prince of Darkness'; 'Those Westerton Girls'; 'A Passage through Bohemia'; 'The Inn by the Shore'; 'Mad Sir Geoffrey'; 'The Man with the Amber Eyes,' etc.

JAMES, George Payne Rainsford, English novelist and historian: b. London, 9 Aug. 1799; d. Venice, 9 June 1860. As a young man he traveled widely on the Continent. He began his writing under the influence of Scott's novels, and wrote in all over 100 novels; he was also known as the author of popular historical books, and in 1839 was appointed historiographer royal, in this capacity writing 'History of the United States Boundary Question' and 'The Corn Laws.' In 1850 he was British consul in Massachusetts, two years later was transferred to Norfolk, Va., and in 1856 became consul general at Venice. His novels include 'Richelieu' (written 1825, published 1829); 'Darnley' (1829); 'DeLorme' (1830); 'Philip Augustus' (1831); 'Henry Masterton' (1832); 'The Gypsy' (1835); 'Attila' (1837); 'The Man-at-Arms' (1848); 'King's Highway' (1840); 'Agincourt' (1844); 'The Smuggler' (1845); 'Ticonderoga' (1854). His historical works include 'Memoirs of Great Commanders' (1832); 'Life of the Black Prince' (1836); 'Life of Richard I' (1842–49). James' novels were very popular when first written, and a new edition appeared in 1903.

JAMES, George Wharton, American explorer, ethnologist, lecturer and author: b. Gainsborough, Lincolnshire, England, 27 Sept. 1858. He spent many years in making geological and other researches in California and elsewhere in the southwestern United States, is a member of various learned societies in this country and England; was associate editor *The Craftsman,* 1904–05; editor *Out-West,* 1912–14, and lecturer at the Panama-Pacific and Panama-California expositions, 1915–16. He published 'The Lick Observatory' (1888); 'Nature Sermons'; 'Picturesque Southern California'; 'Missions and Mission Indians of California'; 'From Alpine Snow to Semi-Tropical Sea'; 'In and Around the Grand Canyon' (1900); 'Indian Basketry' (1900); 'The Indians of the Painted Desert Region' (1903); 'How to Make Indian and other Baskets' (1903); 'Travelers' Handbook to Southern California'; 'In and Out of the Old Missions of California' (1905); 'The Story of Scraggles'; 'The Wonders of the Colorado Desert' (1906); 'What the White Race May Learn from the Indian'; 'Through Ramona's Country' (1907); 'The Grand Canyon of Arizona' (1909); 'The Hero of California' (1910); 'Indian Blankets and their Makers'; 'California, Romantic and Beautiful' (1914); 'The Lake of the Sky, Lake Tahoe'; 'Our American Wonderlands' (1915); 'Living the Radiant Life'; 'Quit Your Worrying'; 'Arizona, the Wonderland'; 'Reclaiming the Arid West' (1916); 'Exposition Memories' (1917); 'House Blessing and Guest Book' (1918).

JAMES, Henry, American Swedenborgian theologian: b. Albany, N. Y., 3 June 1811; d. Cambridge, Mass., 18 Dec. 1882. He was educated at Union College and Princeton Theological Seminary, traveled abroad and became a Sandemanian and later a Swedenborgian. He subsequently lived in New York, Newport, R. I., and lastly at Cambridge. Among the most noted of his works on morals and religion are 'What is the State?' (1845); 'Moralism and Christianity' (1852); 'Lectures and Miscellanies' (1852); 'The Nature of Evil' (1855); 'Christianity the Logic of Creation' (1857); 'Substance and Shadow' (1863); 'The Secret of Swedenborg' (1869). His 'Literary Remains,' edited by William James, appeared in 1885. He was the father of William and Henry James (qq.v.).

JAMES, Henry, American novelist and essayist: b. New York, 15 April 1843; d. London, 28 Feb. 1916. He was the son of a clergyman, Henry James (q.v.), who gained fame as a writer on philosophico-theological subjects, first from the Sandemanian and afterward from the Swedenborgian standpoint. The novelist, known until his father's death as Henry James, Junior, was educated under his father's guidance in New York, Geneva, Paris and Boulogne. He lived in Europe with his parents during the years 1855–59, and after his return to the United States studied in the Harvard Law School in 1862. He began his literary career about 1865 as a contributor to American magazines, and soon afterward published 'The Story of a Year, a tale of the American Civil War.' In 1869 he took up his residence in Europe, and resided chiefly in England and Italy. In 1915, the year before his death, he became a naturalized British subject and on 2 Jan. 1916 was decorated by King George V with the Order of Merit. 'Roderick Hudson' (1875) was his first long novel. His subsequent novels include 'Watch and Ward' (1878), originally published in 1871, in the *Atlantic Monthly*; 'The American' (1877), by some regarded as his best; 'Daisy Miller' (1878); 'The Europeans: a Sketch' (1878); 'Confidence' (1880); 'Washington Square' (1880); 'A Bundle of Letters' (1880); 'Diary of a Man of Fifty' (1880); 'The Portrait of a Lady' (1881); 'The Bostonians' (1886); 'Princess Casamassima'

(1886); 'The Tragic Muse' (1892); 'The Other House' (1896); 'The Spoils of Poynton' (1897); 'What Maisie Knew' (1897); 'The Awkward Age' (1899); 'The Sacred Fount' (1901); 'The Wings of a Dove' (1902); 'The Better Sort' (1903). He has also written a great many short stories, among which are 'A Passionate Pilgrim, and other Tales' (1875); 'Pension Beaurepas' (1878); 'An International Episode' (1879); 'The Madonna of the Future, and Other Tales' (1879); 'The Siege of London' (1883); 'The Point of View' (1883); 'Tales of Three Cities' (1884); 'The Author of Beltraffio, and other Stories' (1885); 'Stories Revived' (1885); 'The Aspern Papers, and other Stories' (1888); 'The Reverberator' (1888); 'A London Life, and other Stories' (1889); 'The Lesson of the Master, and other Stories' (1892); 'The Real Thing, and other Tales' (1893); 'Picture and Text' (1893); 'The Private Life' (1893), a collection of stories; 'The Album' (1894); 'The Reprobate' (1894); 'Tenants' (1894); 'Disengaged' (1894); 'Terminations, and other Stories' (1896); 'In a Cage' (1898); 'The Two Magics' (1898), consisting of two stories; 'The Soft Side' (1900), a series of stories; 'Question of our Speech; The Lesson of Balzac' (1905); 'American Scene' (1906); 'Italian Hours' (1909); 'Julia Bride' (1909); 'Finer Grain' (1910); 'The Outcry' (1911); 'Small Boys and Others (1913). In very many of his stories he describes the life of Americans in Europe, and they depend for much of their interest upon the contrasts between American and European character and institutions. Though a very prolific writer, he was never careless, his style being always felicitous, while in respect to the substance of his work he ranked as the subtlest of American novelists. A dramatic version of 'The American' was produced in London in 1891, but neither it nor his subsequent play 'Guy Domville' (1895) was successful. He turned his intimate knowledge of modern French literature to good account in his volume of essays entitled 'French Poets and Novelists' (1878). Other works of a similar kind are 'Transatlantic Sketches' (1875); 'Portraits of Places' (1884); 'A Little Tour in France' (1884; new ed., 1900); 'Partial Portraits' (1888); 'Essays in London and Elsewhere' (1893). He also contributed the volume on 'Hawthorne' (1879) in the 'English Men of Letters' series, and in 1903 published 'William Wetmore Story and his Friends,' a notable biography. A revised definitive edition was issued of his 'Novels and Tales' (24 vols., 1909). See AMBASSADORS, THE; DAISY MILLER.

JAMES, James Alton, American educator: b. Hazel Green, Wis., 17 Sept. 1864. He is a graduate of the State Normal School, Platteville, Wis., and the University of Wisconsin 1888, receiving his Ph.D. from Johns Hopkins University in 1893. He was superintendent of schools in Darlington, Wis., 1888–90; professor of history in Cornell College, Iowa, 1893–97. Since 1897 he has occupied the chair of history in Northwestern University as head of the department, and is also the chairman of the graduate student work of the university. He is a member of several educational and historical societies. He is the author of (with Allen Hart Stanford) 'Government in State and Nation' (1901); 'Our Government' (1903); 'American History' (1909); 'Readings in American History' (1914). He is the editor of the 'History of Contemporary Civilization' by Charles Seignobos (1909), and the George Rogers Clark Papers for the Illinois State Historical Society Papers (1912).

JAMES, Jesse W., American outlaw: b. Clay County, Mo., 1847; shot to death, Saint Joseph, Mo., 3 April 1882. During the Civil War the family, sympathizing with the cause of the South, suffered greatly at the hands of their neighbors who favored the Union side. Jesse became a member of the guerilla band led by Quantrell and soon established a reputation for courage and daring second to none. At the end of the war he surrendered and returned to his home. In the following year, however, enemies of his family managed to have him declared an outlaw, and thereafter for 16 years he was hunted throughout the land, a price upon his head. His name became a household word throughout America during this long struggle with the authorities. Many romantic adventures and not a few crimes were ascribed to him. He was invariably successful in the exploits he undertook to replenish his stores of ammunition or food, usually effected by train or bank robberies. A reward of $10,000 for his capture dead or alive was offered by the Governor of Missouri, and James was betrayed by the Ford brothers, members of his own gang. Charles and Robert Ford surrendered themselves after shooting James, received the reward, and, strange to relate, were placed on trial and sentenced to death for murder. They were pardoned by the governor. Later in the same year another member of James' band, his brother Frank, surrendered, was in jail awaiting trial for over a year and finally released. He subsequently occupied a farm in the vicinity of Excelsior Springs, Mo., where he died, 18 Feb. 1915. It has been asserted that Jesse James desired to surrender if he could be given a fair trial. Jesse was far from the criminal desperado many have represented him to be. He was chivalrous to women, and during the long years of his struggle with the law committed no crime with the primary intention of taking human life, but was solely actuated by the motive of maintaining his status as a free man. Consult James, Jesse, Jr., 'Jesse James, My Father' (Independence, Mo., 1899).

JAMES, John Angell, English Congregational clergyman: b. Blandford, Dorsetshire, 6 June 1785; d. Birmingham, 1 Oct. 1859. He was educated at the denominational college at Gosport. He entered the ministry when 17 years old and before he was 20 was settled as pastor of the Carr's Lane Parish, Birmingham, where he served until his death. He was one of the most noted preachers of his time. He was the author of 'The Anxious Inquirer' (1849, many other eds.); 'Christian Charity Explained' (6th ed., 1850); 'Christian Father's Present' (13th ed., 1841); 'Christian Fellowship' (11th ed., 1855); 'Christian Professor Addressed' (5th ed., 1852); 'Christian Progress' (1853); 'Church in Earnest' (4th ed., 1851); 'Course of Faith' (1852); 'Earnest Ministry, the Want of the Times' (6th ed.,

1855); 'Elizabeth Bates' (1845); 'Family Monitor' (9th ed., 1848); 'Female Piety' (4th ed., 1855); 'Sunday School Teachers' Guide' (17th ed., 1845), and many other minor works. His works were collected and published in 17 vols. (1860–64). The last volume contains his autobiography. Consult also Dale, R. W., 'Life and Letters of John Angell James' (1861).

JAMES, Louis, American actor: b. Tremont, Ill., 3 Oct. 1842; d. 1910. His first appearance on the stage was at Louisville, Ky., in 1864. From 1865 to 1870 he was a member of the company organized by Mrs. John Drew, and from 1871 to 1875 was a member of the famous company of Augustin Daly, New York. After 1875 he appeared with Lawrence Barrett and Joseph Jefferson. From 1892 to 1895 he starred in a series of classical revivals. His most successful Shakespearean rôles were Autolycus, Nick Bottom and Cardinal Wolsey. Consult Clapp and Edgett, 'Players of the Present' (New York 1900).

JAMES, Ollie M., American legislator: b. Crittenden County, Ky., 27 July 1871; d. 28 Aug. 1918. He received an academic education and in 1887 was appointed page of the Kentucky legislature. He made his law studies under his father and in 1891 was admitted to the Kentucky bar. In the contest for the governorship of Kentucky Mr. James was one of the attorneys for the late Governor Goebel. In 1896 he was a delegate to the Democratic National Convention; was delegate-at-large in 1904 and in 1908. In the convention of 1908 he seconded the nomination of William J. Bryan for the Presidency. He was chairman of the Kentucky State Democratic Convention of 1900 and from 1903 to 1913 was a member of Congress from the First Kentucky District On 10 Jan. 1912 he was elected United States Senator for the term 1913–19. In 1912 he was chairman of the Democratic National Convention, which nominated Woodrow Wilson for the Presidency.

JAMES, Thomas Lemuel, American banker and Postmaster-General of the United States: b. Utica, N. Y., 29 March 1831; d. New York, 11 Sept. 1916. He early learned the printer's business and bought out a weekly Whig paper, the *Madison County Journal,* at Hamilton; and in 1856 changed its name to the *Democrat-Republican,* which was for 10 years the most powerful Republican organ in Madison County. He was collector of canal tolls at Hamilton 1854–73; was appointed inspector of customs in New York 1861; weigher in 1864; and in 1870 was promoted to be deputy collector in charge of the bonded warehouse, which department he immediately proceeded to arrange according to a new system. In 1873 President Grant appointed him postmaster of New York, and he was reappointed by President Hayes in 1877. He filled this office with signal success and originated improvements in the delivery system, involving the whole postal methods of the United States. President Garfield in 1881 gave him the portfolio of Postmaster-General, and his chief important service was his initiation of inquiries which led to the investigation of the Star Route frauds, the saving of over $2,000,000 a year to the department, and a recommendation for a reduction of letter postage from three cents to two cents which was soon adopted. He received the degree of A.M. from Hamilton College in 1863 and that of LL.D. from Madison University 1883, Saint John's College 1884 and Saint Francis Xavier's College 1886. From 1882 he was president of the new Lincoln National Bank of New York city, which brought him into intimate relations with some of the most powerful financiers of the metropolis and the nation. In 1895 he was elected mayor of Tenafly, N. J.

JAMES, Thomas Potts, American botanist: b. Radnor, Pa., 1803; d. 1882. He acquired an interest in a wholesale drug firm in Philadelphia, in which city he lived nearly all his life. Removing to Cambridge, Mass., in 1867, he began extensive researches in botany. Many of his papers appeared in 'Proceedings of the Philadelphia Academy of Natural Sciences' and in 'Proceedings of the American Academy of Arts and Sciences.' He wrote the article "Musci" in King's 'Exploration of the 40th Parallel' and collaborated with Lesquereux in 'Manual of American Mosses' (1884).

JAMES, William, English naval historian: d. London, 28 May 1827. The date of his birth is unknown. In 1801–13 he practised as a proctor in the Jamaica Admiralty Court. He was interned in the United States when war broke out with Britain in 1812, but he effected his escape and reached Halifax. In the *Naval Chronicle* he published a number of articles which he signed "Boxer." In 1816 appeared his 'Inquiry into the Merits of the Principal Naval Actions between Great Britain and the United States,' which in the following year appeared in an enlarged edition. This work was very partisan, James being violently anti-American. Cooper wrote a refutation in 1839, but erred on the other side. Roosevelt's 'Naval War of 1812' (1882) was the first fair presentation of the subject. James' fame rests, however, on his great 'Naval History of Great Britain,' begun in 1819, which appeared in five volumes (1822–24) and reprinted (6 vols., 1826). Editions appeared in 1837 and in 1886, and an epitome by R. O'Beirne appeared in 1888. In 1895 an 'Index' was issued by the Naval Records Society.

JAMES, William, American psychologist and philosopher: b. New York, 11 Jan. 1842; d. Chocorua, N. H., 26 Aug. 1910. He was the son of Henry James, theologian, and brother of Henry James, novelist. He was educated in New York and abroad, studied in 1861–63 at the Lawrence Scientific School of Harvard University, accompanied the Thayer expedition to Brazil in 1864–65, was graduated from the Harvard Medical School in 1870, in 1872 was appointed instructor in anatomy and physiology at the school, and in 1876 assistant professor of physiology. In 1885 he was appointed assistant professor of philosophy in the university, in 1889 professor of psychology, and subsequently professor of philosophy. He was Gifford lecturer on natural religion in the University of Edinburgh (1899–1901); Lowell Institute lecturer (1906); and Hibbert lecturer on the modern status of philosophy at Manchester College, Oxford (1909). His best-known work was done in the domain of analytical psychology, in which he won European recognition. His works are marked by a most readable style and skilful exposition of different topics, no-

tably «radical empiricism» and «pragmatism.» He was a founder of the American Society for Psychological Research in 1884, and published 'Principles of Psychology' (1890); and 'Psychology, Briefer Course' (1892), both popular textbooks; 'The Will to Believe' (1897); 'Human Immortality' (1898); 'Talks to Teachers on Psychology' (1899); 'The Varieties of Religious Experience' (1902); 'Pragmatism' (1907); 'A Pluralistic Universe' (1909); 'The Meaning of Truth' (1909); 'Memories and Studies' (1911); 'Some Problems of Philosophy' (1911); 'Essays in Radical Empiricism' (1912). Consult 'Essays Philosophical and Psychological in Honor of William James, by his Colleagues at Columbia University' (London 1908); Flournoy, Th., 'The Philosophy of William James' (New York 1917); Knox, H. V., 'Philosophy of William James' (London 1914); Royce, J., 'William James, and Other Essays on the Philosophy of Life' (New York 1911).

JAMES, Epistle of, one of the seven New Testament epistles called «Catholic» or «General,» because addressed, unlike Paul's writings, to no specific group or individual, but «to the twelve tribes of the Dispersion,» the latter term being given no such local limitation as is attached to it in 1 Peter i, 1. Though lacking the customary thanksgiving, prayer and concluding salutations or benediction, the conventional epistolary tokens appear in the introductory signature, address and formula of greeting, followed by some 60 hortatory imperatives. The readers addressed as «the twelve tribes,» like those who in 1 Peter i, 1, and Gal. vi, 16, are styled «the elect» and «the Israel of God,» are Christian believers. (Compare Gal. iii, 29; Phil. iii, 3). The writer has added to his name «James» no further clue to his identity, such as Paul and Peter's designation of themselves as «apostles,» or the words «the brother of James,» attached to the name of Jude (ver. 1). The assumption that the author was «James, the Lord's brother» (Gal. i, 19; ii, 9, 12) has made from the time of Origen (A.D. 230) an inevitable and fascinating appeal to the imagination. The adamantine obstacle, however, to the theory of a pre-Pauline date and authorship lies in the drastic polemic of ii, 14–26 against such an antinomian abuse of his distinctive doctrine of saving faith as he foreshadowed and reprobated in Phil. iii, 18 f. A Hebrew Christian, familiar with Old Testament characters, the Septuagint version and the Wisdom books, he shows no trace of the mysticism of Paul and John, making no single allusion to Christ's incarnation, death, resurrection, or to forgiveness in His name. Twice only does he mention Jesus' name (i, 1; ii, 1), though no whit behind Paul in reproducing the ethical lucidity and rigor of his divine Master. His literary form is that of the Greek diatribe, the traditional style of the street-preacher of philosophic morals, shaped to arrest and hold the attention of passers-by (Acts xvii, 17 f). It is «wisdom crying aloud in the street» (Prov. i, 20) with bold challenges, pointed questions, imaginary interruptions from objectors, striking metaphors, cogent similes and abrupt transitions and repetition of topics. His method is not the systematic development of argument, but that of antiphonal contrast, as found in the Proverbs and the Sermon on the Mount. Thus the double meaning of the Greek word *πειρασμός* suggests in i, 2–11 the mutual aspects of prayerful fortitude in trials from without, and in i, 12–18 the tragic issues of temptation from within. Similarly the ethics of word and deed are treated in recurrent refrains. Tongue religion and heart religion are contrasted in i, 19–26; reckless and conceited censoriousness with the spirit of peace-making, in iii, 1–18; the thoughtless boasting of future plans with trust in Providence, in iv, 13–17; and the Oriental habit of profane swearing with simplicity of utterance in v, 12. So in i, 27–ii, 26 the caricature of a dead faith that courts the rich and feeds the poor with pious platitudes is opposed to a living faith of deeds; and in v, 1-6 and iv, 1–12 the spirit of worldly greed and pride is set over against a humble walk with God. In v, 7–11, 13–20, as before in i, 5, prayer for patience and mutual confession and intercession are commended.

Though authorship and date must remain uncertain, as in the case of Job and Hebrews, yet none the less aptly do the words of the Pastoral Epistle apply to this Scripture as «profitable for teaching, for reproof, for correction, for instruction which is in righteousness.» (2 Tim. iii, 16).

Bibliography.— Discussion of authorship, date, style, vocabulary may be found in New Testament Introductions: T. Zahn (Eng. trans., 1909); J. Moffatt (1911); B. Weiss (1897); H. J. Holtzmann (1892); A. Juelicher (1904); A. S. Peake (1910); and detailed exegesis in commentaries: J. B. Mayor (3d ed., 1910); W. Beyschlag's Meyer (3d ed., 1897); H. von Soden in Holtzmann's 'Hand-Commentar' (3d ed., 1899); Oesterley in Expositor's Greek Testament (1910); E. H. Plumptre in 'Cambridge Bible' (1884); F. J. A. Hort (1909); R. J. Knowling in 'Westminster New Testament' (1904); J. H. Ropes (1916).

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JAMES BAY, Canada, an inlet of Hudson Bay, in the southern part, named in honor of Capt. Thomas James, an English navigator, who explored this body of water in 1631–33. The bay is about 320 miles long and from 140 to 160 miles wide. It contains a number of islands, the largest, Agomska, being about 70 miles in length. Several large rivers flow into James Bay; the Albany, Moose, Noddawai and East Main are the largest. Moose Factory, at the mouth of Moose River, on the southern shore, is the most important Canadian trading station, next to York Factory, of the Hudson's Bay Company.

JAMES OF COMPOSTELLA. See COMPOSTELLA, ORDER OF SAINT JAMES OF; and JAMES, SAINT, THE, «GREATER.»

JAMES ISLAND, S. C., an island in Charleston Harbor, famous for its sea island cotton. It is separated from the city of Charleston by the Ashley River and the South Channel of the harbor, here a little over a mile wide. On the northeast coast of the island is Fort Johnson and nearby a quarantine station. Just northeast of the island is Fort Sumter (q.v.). The battle of Secessionville, fought on

16 June 1862, and several other engagements of the Civil War, took place on this island. Pop. 3,147.

JAMES MILLIKEN UNIVERSITY, Ill., an organization which includes three institutions of learning: the Lincoln College, located at Lincoln, Ill.; the Industrial School and the Decatur College, at Decatur, Ill. The synods of the Cumberland Presbyterian Church of Iowa, Indiana and Illinois, founded in 1865 the Lincoln College, comprising schools of art, music and elocution, a classic college and a preparatory department, at times a commercial school. The Decatur College and Industrial School are endowed institutions opened in 1903. In 1900–01 a fund for a university was provided by gifts from James Milliken, an appropriation from the Cumberland Presbyterian synods of Iowa, Illinois and Indiana, and donations from the citizens of Decatur. The three schools mentioned were united in the James Milliken University, but each one retains to a certain degree its own independence. Lincoln College has a faculty of 18 and an annual average attendance of nearly 300 students. The Decatur institutions have a faculty of 58 and an annual average attendance of over 1,100 students.

JAMES RIVER, a stream which, rising in Wells County, in North Dakota, flows south into South Dakota, and in a southerly direction across the State into the Missouri River. It is about 450 miles long. On or near the James River are Aberdeen, Huron, Mitchell and Yankton near the mouth, in South Dakota; and Jamestown in North Dakota.

JAMES RIVER, the largest river in Virginia, rises in the western part of the State, in the Alleghany Mountains, the head-waters being the Jackson and Cowpasture rivers which unite at Iron Gate in Virginia. The James flows southeast to Buchanan, in Botetourt County, then northeast to Balcony Falls, where it breaks through the Blue Ridge Mountains, again southeast to Lynchburg, then northeast to Scottsville, from which point the general course is southeast to the Chesapeake Bay. Its length is about 450 miles. At the Rocketts, just below Richmond, where the river becomes a tidal stream, is the head of navigation for steamboats of 130 tons, about 150 miles from the mouth. Ocean steamers come up the river as far as City Point, at the mouth of the Appomattox River. From City Point to the mouth, 66 miles, the stream is really a broad, deep estuary with Hampton Roads (q.v.) at its entrance to the Chesapeake. The falls in the river at Richmond, about 100 feet in six miles, furnish a large amount of water power. From Richmond to Buchanan, a distance of nearly 200 miles, the Kanawha Canal follows the course of the river and utilizes extensive reaches of slack water navigation. The chief tributaries of the James are the Chickahominy (q.v.) from the north, and the Appomattox from the south. The broad body of water at the entrance into Chesapeake was early explored by European navigators, and Jamestown (q.v.) the first permanent English settlement, was located on this river.

JAMESON, jā'mē-sŏn, **Anna Brownell Murphy,** English author and art critic: b. Dublin, 17 May 1794; d. Ealing, Middlesex, England, 17 March 1860. In 1827 she was married to Robert Jameson, afterward speaker of the house of assembly of Upper Canada, and Attorney-General, but the union proved unhappy. She made her first appearance as an authoress by the publication of the 'Diary of an Ennuyée' (1826), which was very favorably received. Her 'Loves of the Poets' appeared (1829), and was succeeded by 'Memoirs of Female Sovereigns' (1831) and 'Characteristics of Shakespeare's Women' (1832). In 1836 Mrs. Jameson visited her husband in Canada and published 'Winter Studies and Summer Rambles in Canada' (1838). Later works of hers include 'Companion to the Private Galleries of Art in London' (1842); 'Memoirs of the Early Italian Painters' (1845); 'Memoirs and Essays on Art, Literature, and Social Morals' (1846); 'Sacred and Legendary Art' (1848); 'Legends of the Monastic Orders' (1850); 'Legends of the Madonna' (1852). In these the author has given admirable expositions of the works of the old masters and the religious bearings of mediæval art. Few writers have done so much to refine the public taste and diffuse sound canons of art criticism. Consult Macpherson, 'Memoirs of the Life of Anna Jameson' (1878).

JAMESON, John Franklin, American historical writer: b. Boston, 19 Sept. 1859. He was graduated from Amherst College in 1879 and was professor of history at Brown University 1888–1901. He has been managing editor of the *American Historical Review* from 1895 and the head of the department of history at the University of Chicago from 1901. He has published 'History of Historical Writing in America' (1891); 'Dictionary of United States History' (1894; republished as the 'Encyclopedic Dictionary of American History,' 3 vols., 1904).

JAMESON, Sir Leander Starr, South African statesman: b. Edinburgh, Scotland, 9 Feb. 1853; d. London, 26 Nov. 1917. He studied medicine, took his degree, and was gaining a reputation as a skilful young surgeon when he went to South Africa in 1878, where he made the acquaintance of Cecil Rhodes in Kimberley. In 1889, while Rhodes was forming the Chartered Company, he sent Jameson as envoy to negotiate with the Matabele chief Lobengula. Jameson's tact and medical skill overcame the dusky potentate's objections to the Rhodes expedition, which set out in 1890. In 1891 Jameson was appointed administrator of Rhodesia, acting as commander, judge and prime minister. In the Matabele rising of 1893 he accompanied a column to Bulawayo, where he remained after the flight of Lobengula to establish another British administration. The creation of Rhodesia caused great resentment in the Transvaal Republic, as it limited Boer expansion to the north. The struggle between President Kruger (q.v.) and the Uitlanders striving for government reform led to the belief that a rising among the latter was imminent. In December 1895 Jameson, at the head of a small force of Chartered Company's police and volunteers, stood waiting on the Bechuanaland border for the signal. On account of disagreement, however, the revolt in Johannesburg was postponed, and Jameson, with or without the orders of Rhodes, forced the hands of the conspirators by invading the Transvaal

with 500 men and three field guns on 28 Dec. 1895. On 2 Jan. 1896 they were surrounded by the Boers near Dornkop, where they were compelled to surrender. The British government repudiated Jameson's action and entirely disowned him. He was brought back to England, tried and sentenced to a term of imprisonment. He was released after four months on account of sickness. The ill-starred raid produced untold trouble in South Africa, whither Jameson returned to the assistance of Rhodes. The latter died before the close of the South African War (q.v.), and Jameson was elected to his seat in the Cape house of assembly. He had a burdensome "past" to live down, but by 1904 he became the recognized leader of the Progressive party. In that year he became Prime Minister of Cape Colony, holding that office till 1908. His administration was marked by economy, internal reforms and a sincere desire to reconcile the conflicting elements of Boer and Briton. Rhodes' great dream of union in South Africa was unswervingly pursued by Jameson, and it was in a large measure due to his efforts that that ideal was realized in 1909. The policy which he stamped upon the Unionist party at the Bloemfontein conference in 1910 has been maintained to the present day. From 1908 to 1912 he sat in the Opposition; in the latter year illness compelled him to resign and return to England. In 1913 he was elected chairman of the Chartered Company in London. As chairman of the Central Prisoners of War Committee during the European War he performed valuable service to the government. In many British eyes "Doctor Jim" was regarded as a hero; what he tried to do with 500 men it took the government 2,500,000 men and a three years' war to accomplish. See JAMESON RAID; RHODES, C.; RHODESIA; SOUTH AFRICA; SOUTH AFRICAN WAR.

JAMESON, Robert, Scottish naturalist: b. Leith, 11 July 1774; d. 28 April 1854. In 1800 he went to Freyberg, Saxony, to study natural history under Werner, and in 1804 was elected to the professorship of natural history in the University of Edinburgh. In 1809 he published 'Elements of Geognosy,' in which he gave a comprehensive exposition of the Neptunian theory as modified by Werner. In 1819, with Sir David Brewster, he founded the *Philosophical Journal* of Edinburgh, of which he became editor. He also founded, in 1826, the *New Philosophical Journal.* Others of his principal works are 'System of Mineralogy' (1804); 'Mineralogical Description of the County of Dumbarton' (1805); 'Manual of Minerals and Mountain Rocks' (1821); 'Elements of Mineralogy' (1837). He was a fellow of almost all the learned societies of Europe.

JAMESON RAID. See JAMESON, LEANDER STARR.

JAMESONITE, a sulphide of lead and antimony, $Pb_4Sb_2S_5$. Known as feather ore and a minor source of lead in various mines in Arizona, California, Nevada, South Dakota and Utah.

JAMESTOWN, British naval coaling station, seaport and town, on the island of Saint Helena, in the south Atlantic. It contains an observatory. Nearby is shown the tomb of Napoleon Bonaparte, whose body was transported thence to Paris in 1845. Pop. 1,439.

JAMESTOWN, N. D., city, county-seat of Stutsman County, on the James River, and on the main line and a branch of the Northern Pacific Railroad, about 80 miles west of Fargo on the Red River of the North, and 100 miles east of Bismark on the Missouri River. It is situated in an agricultural region, noted for its extensive wheat fields and large stock farms. Some of the industrial establishments are flour-mills, grain elevators, stock-yards, wholesale groceries, lumber, brick yards and municipal waterworks. It is the trade centre for a large extent of country, and the small towns off the railroad procure their local supplies of manufactures and groceries from Jamestown. Among prominent public buildings are the Roman Catholic cathedral, a fine courthouse, public library, State hospital for the insane, hospital, Saint John's Academy and the Presbyterian College. Pop. 4,358.

JAMESTOWN, N. Y., city in Chautauqua County, on the Chadakoin River, which is the outlet of Chautauqua Lake upon the southern end of which Jamestown is located; on the main line of the Erie Railroad and connected with the main lines of the New York Central and Nickle Plate railroads by two modern electric traction lines, the Jamestown, Westfield and Northwestern and the Chautauqua Traction Company, the one skirting the east side of Chautauqua Lake and the other the west side; 70 miles by rail southwest of Buffalo; Jamestown and Warren Electric connects with Pennsylvania at Warren, Pa.; lake steamers make regular trips connecting with all towns on Chautauqua Lake. The first permanent settlement was made in 1810 by settlers in search of agricultural lands. The location, so near the outlet of the lake and in the midst of a fertile agricultural region, attracted settlers, and in 1815 the town was planned; incorporated as a village in 1827. Jamestown is the principal furniture centre of the East, has large manufactories of metal furniture, metal doors and interior trim; has several large worsted, cotton, yarn and towel mills; manufactures photographic papers, automobile axles and radiators, wood carvings, washing machines, veneer and panels, voting machines, pianos, paving brick, tools, window screens, mirrors, beehives, etc. The James Prendergast Free Library cost $125,000 and contains 25,000 volumes and a number of very fine paintings. The high school and 12 branch schools furnish opportunity for an excellent education. The proximity of the famous Chautauqua Institution brings to the vicinity annually many of the great authorities of the world in science, art, letters, government, music, etc. The municipal officers of Jamestown are a mayor, who holds office two years, a city council, a clerk, overseer of the poor, sealers of weights and measures, market-master, constables, assessors, justices of the peace and police justice, all of whom are elected by the people. Other subordinate officials are appointed by the mayor subject to the approval of the council. Jamestown was the home of Reuben E. Fenton (q.v.). There are about 10,000 Swedes now living in James-

town. Those who were born in Sweden still use their native language in their homes, but all are naturalized American citizens. The Norden Club is one of the finest Swedish clubs in the country and has a number of very fine examples of Swedish art in paintings and sculpture. Pop. 37,839.

JAMESTOWN, Va., in James City County, the first permanent English settlement in the New World, and capital of Virginia 1607–98, on what was a peninsula of the James River some 32 miles from its mouth, nearly opposite the present Williamsburg, with a neck overflowed at high tide, and since then washed away, leaving the place an island; the front also has been eaten away by the river, so that the site of the original huts is submerged. It was ill chosen and malarious, and the place never prospered; but no towns did in early Virginia. It was founded 13 May 1607 by the company of Gosnold, Wingfield, John Smith, etc., with Captain Newport; and was first a triangular wooden blockhouse called Fort James, after the king, around which some huts sprang up. These were entirely destroyed by fire in 1608, but soon rebuilt. In 1609 there were 50 or 60 wooden houses of one and two stories, with a chapel and a storehouse, surrounded by a log palisade 15 feet high and with a fort at the neck. During the Starving Time of 1609–10 it was nearly depopulated, and on 7 June 1610 the remnant deserted it and started for England; but meeting Lord Delaware with provision ships at the mouth of the river, all turned back and reoccupied it. Delaware found the chapel "ruined and unfrequented." In 1616 John Rolfe says there were 50 inhabitants. By 1619 a church of hewn timber 50 by 20 had been built; in July 1619 the first legislative assembly in America was held there. A timely warning enabled its inhabitants to escape the great Indian massacre of 1622, and it was a place of refuge for those outside it. The first brick edifice in Jamestown was erected in 1640; a brick church some time after; between 1676 and 1684 was built the brick church whose ivy-mantled tower still stands, and which is incorrectly supposed by many tourists to be the one in which Rolfe married Pocahontas. About the same time a more ambitious fort was begun, with a magazine still traceable; but so injudiciously located for guarding the river-channel that it was above instead of below the place to be defended. Jamestown has little history separate from the colony thence till Bacon's Rebellion (q.v.); as Berkeley's capital, it was burnt to the ground by Bacon, that it might no longer "harbor the rogues." Again rebuilt, in the last decade of the century it was once more destroyed by fire, and never rose from its ashes. It had long been dwindling, and removal of the capital had been mooted, and in 1698 Williamsburg was made the capital. Till very recent years the ruins of Jamestown were left to sink gradually into the encroaching river; but some years ago the Association for the Preservation of Virginia Antiquities bought it, and with the help of the national government have built a sea-wall and saved the relics from further destruction. Besides the church tower a few tombstones and remains of two or three houses still exist. Consult Tyler, 'Cradle of the Republic' (1900).

JAMESTOWN TERCENTENNIAL EXPOSITION, a commemoration of the 300th anniversary of the settlement of Jamestown, held at Hampton Roads, Va., 26 April–30 Nov. 1907. The grounds on the south shore of the Roads covered 350 acres. There were eight principal buildings in Georgian style erected around Raleigh court. Lesser buildings housed the exhibits of the several States and foreign countries. In all there were about 2,500 exhibits grouped into historic arts, education, social economy, machinery and transportation, manufactures and liberal arts, agriculture, forestry, food products, fish and game, metallurgy and mining. Total admissions aggregated 2,800,000, of which only 1,500,000 were paid. Financially the affair was a fiasco, as the final accounting showed a deficit of $2,655,000. Consult 'Final Report of the Jamestown Ter-Centennial Commission' (Washington 1909) and 'Official Blue Book of the Jamestown Ter-Centennial Exposition, A.D. 1907' (Norfolk 1909).

JAMESTOWN WEED. See DATURA.

JAMI, Nur-Ed-Din 'Abd-ur-Rahman Ibn Ahmad, Persian poet and mystic: b. Jam, Khorasan, 1414; d. Herat, 9 Nov. 1492. He received an excellent education as is evident from his polished style. He was the last great classic poet of Persia and was deeply versed in Sufic philosophy. In three 'Diwans,' appearing from 1479 to 1491, are his odes and lyrical poems. His principal prose work is the 'Baharistan' (1487). Other works are in the collection 'Haft Aurang' (Seven Thrones). The 'Baharistan' has been twice translated into English, lastly by Fardunji (Bombay 1899). Edward Fitzgerald translated 'Salaman wa Absul' from the 'Haft Aurang' collection, in 1856, and 'Yusup u Zulaika' was translated by Griffith in 1901. Consult Davis, 'The Persian Mystics: Jámí' (New York 1908), and Costello, 'Rose Garden of Persia' (Boston 1901).

JAMIESON, John, Scottish lexicographer: b. Glasgow, 3 March 1759; d. Edinburgh, 12 July 1838. He was educated at the University of Glasgow and also studied for a short time in Edinburgh. In 1789 he was licensed to preach and became pastor of an Anti-burgher congregation at Farfar; in 1797 he accepted a call to the Nicholson Street Anti-burgher church of Edinburgh. Jamieson's reputation as a man of letters rests on his 'Etymological Dictionary of the Scottish Language' (1808–09; supplement 1825). It is a work of great industry and considerable value as a collection of Scottish words, phrases, customs, etc.; but as first published had little critical or philological merit, according to the present standard. The philological department was greatly strengthened in the edition by Donaldson and Longmuir (1879–87). Jamieson also published 'Ancient Culdees of Iona' (1811); 'Hermes Scythicus, or the Radical Affinities of the Greek and Latin Languages to the Gothic' (1814); 'An Historical Account of the Royal Palaces of Scotland.'

JAMITZER, or **JAMNITZER, Wenzel,** German goldsmith: b. Vienna, 1508; d. 1585. Early in life he went with his family to Nuremburg and in 1534 was admitted to the guild of master craftsman. Subsequently he was appointed goldsmith to the court, serving successively Emperor Charles V, Ferdinand I, Maxi-

milian II and Rudolph II. Many fine specimens of his handiwork are extant, including a jewel box in the collection of the Dresden palace, a gilt silver table piece in the Rothschild collection, Paris, statuettes in the Treasury at Vienna, a jewel box in the Munich Treasury and a cup belonging to the deposed emperor, Wilhelm II of Germany.

JAMMU, India, capital of the state of the same name in Kashmir, northern India, on the river Tavi. The town and palace are on the right bank of the stream, while on a height on the opposite bank is a great fort overlooking the town. There are extensive ruins which attest the former splendor of the city. It contains the palace of the Maharaja, a hospital, college and many temples. Coal mines are operated in the vicinity and the city is now reached by a railway. It has a modern water-supply system. Pop. 31,700.

JAN MAYEN, yän mī'ĕn, an island in the Arctic Ocean, about 250 miles northeast of Iceland; area, about 160 square miles. It is volcanic, with an irregular surface, mountainous near the extinct volcano, Beerenburg, about 6,500 feet in height. One of the active volcanoes is about 1,500 feet high. There are some large glaciers on the island, one near Beerenburg. The island was named after Jan Mayen, a Dutch navigator, who discovered the land in 1611. Later it was ascertained that Henry Hudson visited the island in 1607. Vessels from Norway and Scotland occasionally visit the island. In 1882–83 scientists from Austria lived on the island for some months, engaged chiefly in making meteorological observations.

JANAUSCHEK, yä'now-shĕk, **Fanny** (FRANZISKA MAGDALENA ROMANCE), American actress: b. Prague, Bohemia, 20 July 1830; d. Amityville, L. I., 28 Nov. 1904. She first went upon the stage in Cologne, playing in that city and also in Frankfort, 1848–60, and subsequently played in Dresden and the principal cities of Germany. In 1852 she was married to Capt. Frederick Pillot, of the German navy. She made her first tour in America, 1867–69, playing in the German language and securing most favorable notice. Returning to Germany she studied English, and in 1873 made her second visit to the United States, when she played in English the most exacting Shakespearean rôles. She was also very successful in such rôles as Meg Merrilies, Mary, Queen of Scots, and in double rôles, as in 'Bleak House' and other plays. She retired from the stage in 1898.

JANE, Fred T., English naval author: b. 6 Aug. 1870; d. 8 March 1916. He was educated at Exeter School, invented the naval war game, was naval correspondent of the *Engineer,* the *Scientific American* and the *Daily Chronicle,* and has written 'The Lordship, the Passen, and We' (1897); 'The Port Guard Ship' (1899); 'All the World's Fighting Ships' (naval annual); 'The Torpedo in Peace and War' (1898); 'The Jane Naval War Game' (1898); 'The Imperial Russian Navy' (1900); 'Ever Mohun' (1901); 'Hints on Playing the Jane Naval War Game' (1902); 'The Jane Coast Operations War Game for the Instruction of Garrison Artillery in Coast Defense' (1903); 'The Imperial Japanese Navy' (1904); 'Heresies of Sea Power' (1906); 'The Ought-to-Go' (1907); 'The British Battle Fleet' (1912); 'Your Navy as a Fighting Machine' (1914).

JANE EYRE, ār. For its day 'Jane Eyre,' published in 1847, was a most unconventional novel. It came in the wake of multitudes of sentimental novels in which the heroines were perfect and lifeless beings, and the heroes were all handsome and correct in their conduct. Against this unreality, 'Jane Eyre' was a protest, highly emotional, not to say hysterical. The author, Charlotte Brontë, the daughter of a Yorkshire clergyman, had grown up amid the hard surroundings of a bleak parish on the moors, and of boarding schools where the children were ill treated and ill fed. At the age of 30 she decided to put her own rebellious spirit into a novel, which should also follow in some degree the details of her own life. Instead of being rich and beautiful, Jane Eyre is a poor and obscure girl, very small and plain in stature, with pale cheeks and green eyes. But she has a keen intelligence, and is thoroughly honest, outspoken and brave. In this heroine of a new type, Charlotte Brontë sought to depict a young woman who should be true to her opinions, true to herself, under all circumstances, whatever might be the consequences to herself or to others. Likewise the hero, Edward Rochester, was of a kind new to fiction. He was unshapely, his features were large and distorted and he had had an unsavory past. Nevertheless Jane Eyre fell in love with him, to the consternation of readers. There had never been in fiction any proposal of marriage like Rochester's, nor any acceptance like Jane Eyre's, on that moonlit night which ended in thunder and lightning and a deluge of rain.

Though the novelty of 'Jane Eyre' has partially worn away, it still remains a most interesting story. It was admired by Thackeray, to whom the second edition was dedicated; and Trollope praised its just balance between the ordinary incidents of real life and extraordinary occurrences such as an interrupted marriage, strange premonitions, dreams and a spectre. 'Jane Eyre' was a sincere book written by the sincerest of women.

WILBUR L. CROSS.

JANES, Edmund Storer, American Methodist Episcopal bishop: b. Sheffield, Berkshire County, Mass., 27 April 1807; d. New York, 18 Sept. 1876. In 1830 he entered the Methodist ministry in the Philadelphia conference, in 1835 became financial agent for Dickinson College, in 1840–44 was financial secretary of the American Bible Society, and in 1844 was elected bishop. In connection with his episcopal duties he traveled widely in the United States and abroad, and subsequent to the Civil War aided in the reorganization of his Church. He had some reputation as a preacher. Consult Ridgway, H. B., 'The Life of Edmund S. Janes' (New York 1882).

JANESVILLE, Wis., city and county-seat of Rock County, on the Rock River and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 91 miles northwest of Chicago and 71 miles southwest of Milwaukee. The first permanent settlement as a village was in 1837, and it was chartered in 1853. Janesville is located in an agricultural region, noted for the amount and

quality of tobacco raised. The chief manufactures are agricultural implements, foundry products, wagons and carriages, furniture, cotton and woolen goods, flour, fountain pens, porch shades, hammocks, beet sugar, wire fencing, nails, cigars, cigar boxes, cigar box labels and fireless cookers. It has large lumber and brick yards and many large tobacco storage houses. There are two national and two State banks. Its principal trade is in its own manufactured goods, farm and dairy products. Some of its principal buildings are the State School for the Blind, the Saint Joseph's Convent, the Y. M. C. A. buildings, two hospitals, the churches, high school, public library, courthouse, city hall, government building and auditorium. Its attractive retail stores draw a great deal of trade from all points in southern Wisconsin. The city owns its own waterworks and has the commission form of government. The mayor and two councilmen are elected for six-year terms. The mayor appoints subject to confirmation by the councilmen the city attorney, city clerk, treasurer, sealer of weights and measures and assessor, also the board of education and directors of the Public Library and fire and police commissioners. The members of the fire and police departments are selected from the eligible civil service list. The city has always had a slow but steady growth and a gradual expansion in industrial and commercial lines. Pop. 13,894.

JANET, zhā-nā', **Paul,** French philosopher: b. Paris, 30 April 1823; d. 4 Oct. 1899. He was professor of moral philosophy in the college at Bourges 1845–48, and in the University of Strassburg 1848–57; was professor of logic in the Lycée Louis-le-Grand at Paris 1857–64; and from 1867–97 was professor of the history of philosophy at the Sorbonne. In 1864 he was elected a member of the Academy of Moral Sciences; in 1877 was made an officer of the Legion of Honor. His chief works are 'La famille: Leçons de philosophie morale' (1855), awarded a Sorbonne prize; 'Histoire de la philosophie morale et politiques dans l'antiquité et dans le temps modernes' (2 vols., 1858), also crowned by the Academy; 'Le philosophie du bonheur' (1862, 1873); 'Etudes sur la dialectique dans Platon et Hegel' (1860); 'Le materialisme contemporain en Allemagne' (1864); 'Histoire de la science politique' (1871); 'Problèmes du XIXe siècle' (1872); 'Philosophie de la Révolution française' (1875); 'Les causes finales' (1877); 'Saint-Simon et la Saint-Simonisme' (1878); 'Les philosophie française contemporaine' (1879); 'Les maitres de la pensée moderne' (1883); 'Les origines du socialisme contemporain' (1883); 'Victor Cousin et son œuvre' (1885); 'La philosophie de Lamennais' (1890); 'Fénelon' (1892); 'Principes de metaphysique et de psychologie' (1896); and translated Spinoza's 'God, Man and Happiness,' and Leibnitz's 'New Essays on Human Understanding.'

JANET, Piérre, French psychologist: b. Paris, 30 May 1859. He is professor of psychology in the College of France, director of the psychological laboratories at Salpètrière and specialist on nervous and mental diseases. He has been professor of philosophy at the Lycées of Chateauroux and Havre (1881–89); Rollin College and the Lycées Louis-le-Grand and Condorcet (1889–98); Sorbonne (1898–1902), and the College of France (1897–1902). Since this latter date he has been professor of psychology in the College of France. He has published 'Etudes sur Malebranche' (1886); 'Bacon et les alchimistes' (1887); 'L'Automatisme psychologique' (1889); 'L'Etat mental des hysteriques' (1893); 'Nervoses et idées fixes' (1898); 'Les Obsessions et la psychasténie' (1903); The Major Symptoms of Hysteria' (lectures delivered at Harvard University in 1907).

JANEWAY, Edward Gamaliel, American physician: b. near New Brunswick, N. J., 1841; d. 1911. In 1860 he was graduated at Rutgers College and four years later from the New York College of Physicians and Surgeons. During the Civil War he served as acting medical cadet at the Newark Army Hospital. From 1864 to 1866 he was a member of the staff of Bellevue Hospital and subsequently engaged in private practice. In 1872 he was instructor in anatomy at New York University and from 1873 to 1876 taught materia medica and therapeutics in the Bellevue Hospital Medical College. In 1876–81 he was professor of pathological anatomy, from 1881 to 1884 associate professor of the principles and practice of medicine, and in 1884–91 professor at the latter institution. In 1897 he became professor of clinical medicine at University and Bellevue Hospital Medical College. In the following year he was appointed dean, serving in this capacity until 1905. In the same year he was appointed professor of medicine. He was visiting and consulting physician to several hospitals of New York city; was president of the American Academy of Medicine, and of the Association of American Physicians. For six years, beginning in 1875 he held the public office of commissioner of health.

JANICULUM, or **MOUNT JANICULUS,** a hill on the west bank of the Tiber, opposite old Rome. It rises to a height of 300 feet above the sea and affords a fine view of the city. It was also known as Mons Aureus (Montario) and during the reign of Augustus was included in the city limits, becoming the 14th ward as Regio Transtiberina (Trastavere). The Sublicion Bridge first connected it with Rome; the Æmilius Pons was added in 181 B.C. and Pons Valentinianus in 366 A.D. Consult Baedeker, 'Central Italy and Rome' (15th Eng. ed., Leipzig 1909) and Platner, 'Topography of Ancient Rome' (New York 1912).

JANIN, Jules Gabriel, French critic: b. Saint Étienne, department of the Loire, 16 Feb. 1804; d. Paris, 20 June 1874. He was educated at Saint Étienne and at the Collége Louis-le-Grand; studied law and became a private tutor in the Latin quarter of Paris; and then turned to literature, becoming editor, novelist, journalist and critic. He soon became a contributor to several papers, notably the Liberal opposition paper *Le Figaro*, and the government paper *Quotidienne*, and in 1836 became connected as dramatic critic with the *Journal des Débats*, in the columns of which he wrote for nearly 40 years. He possessed a wonderful piquancy of style and an airy grace of sentiment and wit, which made him a delightful retailer of small talk, but as a critic, however, he was utterly inconsistent through lack of any general prin-

ciples of judgment, and said the first thing that entered his mind, though fortunately his lack of judgment was linked with amiability. He was an indefatigable worker and was in constant demand by the publishers of Paris to review books, write prefaces, and do other literary work. Of his published works, one or two of which are remarkable both in substance and style, the following are noteworthy: 'L'âne Mort et la Femme Guillotinée' (1829), which went through several editions; 'Histoire de la littérature dramatique en France' (6 vols., 1858), a selection of his weekly *feuilletons,* altered and remodeled so as to present a sketch of the history of the French stage and dramatic artists during nearly a quarter of a century; 'Rachel et la tragédie,' a biographical and critical work upon that great tragic artist, with photographic illustrations (1859), and a translation of 'Horace' into French (6th ed., 1885). His 'Œuvres de Jules Janin' (12 vols., 1875–78), and 'Correspondence' (1877) appeared after his death. He became a member of the French Academy in 1870.

JANINA, or **YANINA,** Greece, town near the frontier of Albania, on the Lake of Janina, 40 miles inland from the shore opposite Corfu, in the northwestern part of the kingdom. It contains churches, mosques, synagogues, a library, hospital and gymnasium. It contains many ruins and buildings which attest its former splendor. Goldsmithing is carried on as also is the manufacture of silk goods, leather and colored linens. The town belonged to the Eastern or Byzantine Empire in the 9th century. The Normans destroyed it twice in the 11th and 12th centuries and in 1430 it became a possession of Turkey. Under Turkish rule it became the capital of the vilayet of Janina. The Greeks besieged the place in 1913 and took it on 6 March. Under the terms of the treaties of London and Bucharest Janina became part of the kingdom of Greece. Pop. 16,804.

JANIS, Elsie (ELSIE JANIS BIERBOWER), American actress: b. Columbus, Ohio, 16 March 1890. She was educated by private governess and teachers; made her first appearance on the stage as Cain in 'The Charity Ball' (1896). In 1898–1903 she played in vaudeville; starred in 'The Belle of New York' in 1904; later appeared in 'The Fortune Teller' and 'The Duchess.' She starred in 'The Vanderbilt Cup' in 1905–07; and later under the management of Charles B. Dillingham in 'The Hoyden,' 'The Fair Co-ed' (1908–09) and 'Slim Princess' (1910–11). In 1911 she appeared in her own play 'A Star for a Night' and in 1913 in 'The Lady of the Slipper.' She appeared in London in 1914 in 'The Passing Show.'

JANITSCHEK, yä'nē-chĕk, **Hubert,** Austrian historical art writer: b. Troppau, Silesia, 30 Oct. 1846; d. Leipzig, 21 June 1893. He was educated at the university at Gratz 1868–73, from the latter year until 1877 pursued the study of art history in Italy, from 1877–79 was custodian of the Austrian Museum of Art and Industry in Vienna, and was subsequently professor in the universities of Prague (1879), Strassburg (1881) and Leipzig (1891). He was the author of the following biographies in Dohme's 'Kunst und Kunstler'—Andrea del Sarto, Bellini, Paolo Veronese, Tintoretto, etc.; and also wrote 'Die Gesellschaft der Renaissance in Italien und die Kunst' (1879); 'Zwei Studien zu Geschichte der karolingischen Malerei' (1885); 'Geschichte der deutschen Malerei' (in Grote's 'Geschichte der deutschen Kunst,' (Berlin 1890); 'Dantes Kunstlehre und Giottos Kunst' (Leipzig 1892), etc. His wife, MARIE (b. Vienna, 23 July 1859) became known as a poet and novelist, her principal works being 'Legenden und Geschichten' (1885); 'Im Kampf um die Zukunft,' an epic poem (1887); 'Gesammelte Gedichte' (2 vols., 1892); 'Aus Alten Zeiten' (1900); the novels 'Aus der Schmeide des Lebens' (1890); 'Lichthungrige Leute' (1891); 'Atlas' (1893); 'Gott hat es gewollt' (1895); 'Frauenkraft' (1900); 'Harter Sieg' (1901), etc.

JANIUAY, hä-ne-wī, Philippines, a pueblo of the province of Iloílo, Panay, situated 18 miles northwest of the town of Iloílo, near the Jalaur River. It lies in a hilly country and petroleum has been reported in the vicinity. Pop. 28,700.

JANIZARIES, jăn'ĭ-zā-rĭz (Turkish, *jenitcheri,* new soldiers), an infantry force of Turkey, first organized by the Sultan Orkhan about 1330, and in 1362 increased to about 10,000 by Amurath I, who gave them considerable importance by bestowing on them special privileges. The janizaries thus became a class of warriors so deeply imbued with the military spirit that they proved in many instances a means of salvation to the empire. It was their boast that they had never fled in battle, and they were the nerve and sinew of the Ottoman army. The regular troops of janizaries at one time numbered 60,000 or more, but they were afterward reduced to 25,000. They were kept in barracks in Constantinople and a few other cities. The irregular troops amounted to 300,000 or 400,000, and were scattered among all the cities of the empire, in time of peace performing police duties. The janizaries who constituted the sultan's bodyguard became in time so dangerous and their insurrections so frequent that several unsuccessful attempts were made to reform or disband them. In 1826 they rebelled on account of a proposal to form a new militia, when the sultan, Mahmoud II, having displayed the flag of the Prophet, and being supported by their commander-in-chief, defeated the rebels and burned their barracks, and many of them perished in the flames. A royal proclamation abolished the corps. As many as 15,000 were executed, and fully 20,000 were banished.

JANK, Angelo, German artist: b. Munich, 1868. He was educated at the Munich Academy under Höcker and Löfftz and in 1907 he was appointed to a chair there. He excels in the execution of hunting scenes. In 1909 his 'The Hunt' and 'The Horsewoman' were exhibited at the Metropolitan Museum, New York. In addition to these he has executed 'Mailed Defense,' owned by the king of Italy; 'The Hurdle Race,' in the Elberfeld Museum; statue of the Duke of Saxe-Coburg-Gotha; 'Princess and Swineherd,' in Munich. The German government commissioned Jank to execute an historical series in the Reichstag. He is well known also for his colored lithographs.

JANKÓ, yon'ko, **Paul von,** Hungarian pianist and inventor: b. Totis, Hungary, 1856. He made his musical studies at the Conservatory

of Vienna and at Berlin under Ehrlich. His hands being very small, his execution on the piano was hampered through not being able to reach an octave. To obviate this difficulty he invented (1882) the keyboard known by his name. He made several tours in 1886–90 to demonstrate its practicability, introducing it first in London and later in New York. He removed to Constantinople in 1892. The keyboard has six rows of keys placed fanwise in a semi-circle, with three keys to each note, one below the other, and is sometimes called the chromatic keyboard. It is claimed that fingering is much easier and simpler by this method, which despite its undoubted merit has not taken popular hold. The keyboard can be attached to any pianoforte, grand, upright or square.

JANNARIS, Anthony, Greek educator: b. Lakkoi, a village in Kydonia, southwest of Canea, island of Crete, 25 Aug. 1852; d. at sea, 26 April 1909. He was educated at Canea, Athens and Marburg; was Foreign Secretary to the Cretan government 1882–84; headmaster of the public gymnasium there 1883–85; head clerk to the British consulate in Crete 1884–88; and lecturer on Greek literature at Athens University in 1889. He took a prominent part in the Cretan insurrection of 1889–90, and was proscribed by the sultan; and subsequently went to England, where for six years he studied in the British Museum investigating the history of the Greek language. Upon his return to Crete he was elected a member of the Assembly, and during the troubles of 1897 acted as correspondent for the *Times*. From 1896 to 1904 he was lecturer on post-classical and modern Greek at Saint Andrews University and was afterward Inspector-General of Education in Crete. He was a prolific writer on Greek grammar and philology.

JANNES AND JAMBRES. When Moses wrought his wondrous magic before Pharaoh he was opposed by two Egyptian magicians — Jannes and Jambres. They were so much impressed that they became proselytes and accompanied the Children of Israel on their march to the promised land. According to the Talmud, the golden calf was made by Aaron at their instigation. They are mentioned in several apocryphal writings and in 2 Tim. iii, 8. Pliny and Apuleius mention Moses and Jannes as the names of ancient magicians. Eusebius quotes Numenius, a Greek philosopher of the 2d century, as representing Jannes and Jambres as Egyptians.

JANNET, Claudio, French economist: b. Paris, 22 March 1844; d. there, 21 Nov. 1894. He was educated as an advocate and became professor of political economy at the Catholic University of Paris. His work was largely influenced by P. G. F. LePlay (1802–82). Author of 'Etude sur la Voconia' (1867); 'De l'Etat présent et de l'avenir des associations coopératives' (1867); 'L'internationale et la question sociale' (1871); 'Les résultats du partage forcé des successions en Provence' (1871); 'Les Etats-Unis contemporains' (1875; 4th ed., 1888); 'Les sociétés secrètes' (1876); 'Le crédit populaire et les banques en Italie' (1885); 'Le Socialisme d'Etat et la réforme sociale' (1889); 'Le capital, la spéculation et la finance au XIXe siècle' (1892); 'Les ouvriers des doux mondes' (1893), etc.

JANOW, jä'nôv, **Matthias von,** theologian and reformer, considered the Wiclif of the Bohemian Church: date of birth unknown, though he was probably born in Prague; d. there, 30 Nov. 1394. Very little concerning his early life is known, except that he was descended from a noble Bohemian family, studied theology at the University of Prague and later spent about six years at the University of Paris. He then went to Rome, in 1381 was appointed canon of the cathedral of Saint Vitus in Prague and confessor to Charles II, and continued in that office until his death. He had no oratorical ability, but through his writings exercised a remarkable influence on the religious thought of his time. His writings were collected in a work entitled 'De Regulæ Veteris et Novi Testamenti' (1392). In this book he denounced the corruption and evil that existed in the Church, alleged gross misconduct of bishops and priests and urged that all human additions to Christianity, both doctrinal and ceremonial, be eliminated, and that the Church return to its original beliefs and doctrines. The Pope declared these writings heretical, and 16 years after his death they were publicly burned with those of Wiclif. Consult Lützow, 'Life of John Hus' (New York 1909).

JANS, Anneke, ăn'nă-kė yăns (or ANNETJE), Dutch colonist in America: d. Albany, N. Y., 1663. She came from Holland to New Netherland in 1630 with Roeloff Jansen, her husband, who secured in 1636 a grant of a tract of land containing 62 acres and reaching from the Hudson to the present Broadway and from a point near Desbrosses street to Warren street. In 1654, Anneke, upon the death of her second husband, Evarardus Bogardus (q.v.), obtained in her name a patent-right to the tract. In 1671 the land was sold by the heirs to the English Governor Lovelace. Three of the heirs, however, did not sign the document. Subsequently the property was confiscated by the English government and deeded to Trinity Church corporation (1705). From 1749 the possession of the property has been the subject of numerous suits by the heirs, based chiefly on the omitted signatures, and all decided for the defendants.

JANS, Jansen Enikel, or **Enenkel,** Austrian historian and poet: 13th century. He is notable as the author of 'Weltchronik,' a narrative of little historical worth but valuable from a literary standpoint. It was edited by Strauch in 'Monumenta Germaniæ Historica' (Vol. II, Part I, 1891). He also wrote a 'Fürstenbuch,' which deals with the Austrian dukes Leopold VII and Frederick the Quarrelsome, and while historically inaccurate is noteworthy because of the personal anecdotes it contains. It was edited by Rauch in 'Scriptores Rerum Austriacarum' (Vol. I, 1790).

JANSEN, yăn'sĕn, or jăn'sĕn, **Cornelius,** Dutch theologian: b. near Leerdam, Holland, 28 Oct. 1585; d. Ypres, Belgium, 6 May 1638. From his 17th year he applied himself to the study of theology and first came into notice while professor of theology at Louvain (1630), as a teacher of the most rigid Augustinianism, especially in connection with the doctrine of free will and divine mercy. This brought him into conflict with the Jesuits. He was appointed (1636) bishop of Ypres, where he completed

his famous work, on which he had labored for 22 years, under the title 'Augustinus, seu Doctrina Sti. Augustini de humanæ naturæ sanitate, ægritudine, medicina.' In this he declared philosophy, especially that of the Aristotelians, to be the source of Pelagian error, and in accordance with rigid Augustinianism, maintained the utter corruption of human nature and the extinction of free will, together with predestination. The school of thought he thus founded is now known as Jansenism (q.v.).

JANSEN, Olaus, Swedish naturalist: b. Christianstadt, 1714; d. Copenhagen, Denmark, 1778. He was educated in Germany; was a professor in the University of Tübingen for several years; was then appointed to a professorship in the University of Copenhagen, of which he was rector in 1761; and was elected a member of the Academy of Sciences in 1762. In 1764 he was sent by the Danish government to study the natural resources of the South American countries, but during his travels he reached as far north as Central America, Louisiana and Florida. In 1772 he visited Boston. His chief publications are 'Den Geist in den Naturvidenskaben og naturens almindelige laere' (1773); 'Neue Reisen durch Brazilien und Peru' (1775); 'Neue Reisen durch Louisiana und Neuva España' (1776); 'Anmarkningar till Historia Naturalis och climatet i Nye England och Nye Spanien' (1778), etc.

JANSENISM, strictly speaking, denotes both a theological system in the matter of grace and free will, and the Christian sect that has arisen from that system. In a loose sense, Jansenism is the rigid, straightlaced severity of the Jansenists in the application of the principles of morality,— especially in the almost impracticable dispositions they required for Holy Communion. This article confines itself to the strict sense of the word Jansenism; and presents a brief survey of the origin and evolution of both the doctrine and the sect.

I. Origin of Jansenism.— Imbued with the principles of Baius,— Michel de Bay, former professor of scripture at the University of Louvain,— Cornelius Jansenius, bishop of Ypres, wrote his 'Augustinus' to set forth what he deemed to be the teaching of Saint Augustine in the matter of grace and free will. After his death the work was published, A.D. 1640, under the auspices of the University of Louvain. It was prohibited by the papal internuncio, condemned by a decree and by briefs of Pope Urban VIII, denounced and vigorously attacked by the Jesuits; and yet gained rapid vogue. The following year, 1641, a second edition was published at Paris with the approbation of the Sorbonne. A papal commission was then appointed to examine the 'Augustinus'; and it was condemned, 19 June 1643, by Urban VIII in the bull 'in eminenti,' because of its defense of the condemned propositions of Baius.

The complete title of this epoch-making folio is 'Augustinus, seu doctrina Sancti Augustini de humanæ naturæ sanitate, ægritudine, medicina, adversus Pelagianos et Massilienses, tribus tomis comprehensa.' The first part expounds Pelagianism in such wise as to identify therewith the teaching of the Jesuits on grace. The second part treats of Saint Augustine's three states of human nature: the state of innocence before the fall of Adam, that of corruption after the fall, and the hypothetical state of human nature that is neither elevated by grace nor degraded by sin. Herein the teaching of Baius is closely followed. The third part is on grace and predestination.

To make the condemnation of the 'Augustinus' more specific, a new papal commission (1651) selected therefrom five propositions, which are here subjoined and referred to their respective parts in the volume:

1°. Some of God's precepts are impossible to the just, even though they desire and try to observe such, with the strength that they at present have; nor have they the grace by which such precepts might be possible. (Pt. III, Bk. ii, Ch. 13).

2°. In the state of fallen nature, one never resists interior grace. (Pt. III, Bk. ii, Ch. 24).

3°. For merit or blame, in the state of fallen nature, freedom from all internal determining force (*libertas a necessitate*) is not necessary; but freedom from all external determining force (*libertas a coactione*) is enough. (Pt. III, Bk. vi, Ch. 38).

4°. The Semi-Pelagians admitted the necessity of an interior grace, that should precede each act,— even the beginning of the act of faith; and they were heretics in that they taught this grace to be such as man's will might resist or obey. (Pt. I, Bk. viii, Ch. 6).

5°. It is Semi-Pelagian to say that Christ died or shed his blood for all men without exception. (Pt. III, Bk. iii, Ch. 21).

These propositions were condemned as heretical, by Innocent X, in the Constitution 'Cum occasione' (1653); by Alexander VII, in the Constitution 'Ad sanctam B. Petri Sedem,' (1656), and in the Constitution 'Regiminis Apostolici' (1664); by Clement XI, in the Constitution 'Vineam Domini' (1705).

II. The Question of Right.— Before the condemnation by Innocent X, the Jansenists admitted that the five mooted propositions were representative of the theological system of Jansenius. Fundamental to this system is the Baian theory of a never rejected grace (*gratia victrix*). Without this *great grace,* man by the necessity of fallen nature yields to desire (*voluptas*); against this grace, man is not free to follow desire. The elect are predestined to victorious grace and to glory, and that previous to God's foreknowledge of their future merit; only the elect does God sincerely will to save, for them alone did Christ pray and give up his life. The reprobate are absolutely predestined to be deprived of this never failing grace, and that previous to God's foreknowledge of their future blame; and so God does not sincerely will to save the reprobate, nor did Christ die for them. That the condemned propositions of the 'Augustinus' were a nucleus of this theory of morally necessitating grace, and of morally necessitated will, was at first admitted by the Jansenists. Their defense was that the five propositions correctly set forth Saint Augustine's doctrine on nature and grace; and that they had not been rightly condemned.

III. The Question of Fact.— Once the condemnation of Innocent X was published, the Jansenists shifted ground; and undertook their famous evasion by the question of fact. They rejected the five propositions as rightly condemned; but clung to the 'Augustinus.' They denied the fact that the propositions were contained in the 'Augustinus' in the meaning that had been censured as heretical; and insisted that the infallibility of the Church had nothing to do with such facts as the meaning intended by Jansenius and set forth in the 'Augustinus.' Antoine Arnauld was the mightiest champion of

this evasion between 1653 and 1655. The bishops met in Paris, 28 March 1654, and declared that the Pope had condemned the meaning intended by Jansenius; their declaration was approved by Innocent X the following September. The Sorbonne respectfully submitted in 1656. It was then that Pascal stepped into the arena. His 'Lettres Provinciales,' 23 Jan. 1656 to 24 March 1657, poked fun at the Sorbonne for discussing the statements of Arnauld, reveled in raillery about the condemnation and sparkled with witty banter of the Jesuits and their casuistry. Indeed, most of the 'Provinciales' are occupied with villifying the Jesuits, because of the fact that from start to finish they were the chief opponents to Jansenism. At the height of these controversies, the Assembly of the French clergy published its decision, that the infallibility of the Church extended to dogmatic facts, — that is, to facts connected with the deposit of faith,— and therefore to the fact that the meaning of Jansenius, set forth in the 'Augustinus,' was that which had been condemned by the branding of the five propositions as heretical. This decision was confirmed by Alexander VII, 1656, who decided the fact of the heresy of the 'Augustinus.'

Still the Jansenists went on without submission, either in a negative attitude of "respectful silence" or in such positive opposition to the papal decrees as was evidenced by Quesnel in 'Réflexions Morales.' That book reproduced the theory of Jansenius on grace and free will, and was approved by de Noailles, bishop of Châlons, later cardinal and archbishop of Paris. A new papal condemnation was needed. It came in the bull 'Unigenitus,' 1713, whereby Clement XI condemned 101 propositions of 'Réflexions Morales.' Jansenism now reached its strongest and stormiest epoch. The universities of Paris, Rheims and Nantes rejected the bull. Four bishops appealed to a future general council against the 'Unigenitus,' 1717. They were joined by other bishops and many priests. Cardinal de Noailles appealed "from the Pope ill informed to the Pope better informed." Clement XI, by the bull 'Pastoralis officii,' 1718, excommunicated the recalcitrants. The Jansenists and recalcitrants, including Cardinal de Noailles, appealed from the bull 'Pastoralis officii' to a general council. For a while the Church in France was rent with the schism. On the side of the Jansenists were a cardinal, 18 bishops and about 3,000 priests; on the side of the Pope were four cardinals, at least an hundred bishops, and more than an hundred thousand clerics. The schism lasted some 10 years. De Noailles submitted in 1728, and Jansenism gradually died out in France. Not so in the Netherlands. Here the vicars apostolic, who governed the small body of Catholics, were tainted with the ideas of the 'Augustinus' on grace; and gave a refuge to Arnauld, Quesnel and many priests and nuns who refused to submit to the papal decrees against Jansenism. The result was a sect that to-day has dwindled down to about 6,000 members. They keep up the succession of bishops at Utrecht. The Pope is notified of the election and consecration of each new bishop. Rome straightway nullifies the election, and excommunicates the new bishop together with his followers.

Bibliography.— Rapin, 'Histoire du Jansénisme' (1861); Dumas, H., 'Histoire des cinq propositions de Jansénius' (1699); Maynard, 'Les Provinciales et leur réfutation' (1851); Lafitau, 'Histoire de la Constitution Unigenitus' (1737); Le Roy, 'La France et Rome de 1700 à 1715' (1892); Saint Dechamps, 'De hæresi janseniana ab Apostolica Sede merito proscripta' (1654).

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JANSON, zhän-sŏn, **Kristofer Nagel,** Norwegian novelist and educator: b. Bergen, 5 May 1841. He was educated for the ministry at the University of Christiana, later interested himself in the movement for popular education and established a "Popular High School," first in Sel, a district of Gudbrandsdalen, Norway, and afterward in Gausdal. Subsequently he traveled in Italy, in 1879 lectured in the United States, and from 1882 until 1892 was pastor of a Unitarian church in Minneapolis, where he had settled. He also became editor of a Unitarian paper, *Saamanden* ("The Sower"), published in the Norwegian language at Minneapolis. He returned to Norway in 1893. For several years the Norwegian Storthing granted him a poet's pension. Among his published works, of which his earlier novels are written in the so-called *Landsmaal,* are 'Fra Bygdom' ('From the Up-Country Districts,' 1866); 'Norske Dikt,' poetry (1867); 'Jon Arason' (1867), a drama portraying the fate of the last Roman Catholic bishop of Iceland; 'Marit Skjölte' (1868); 'Han og ho' ('He and She,' 1872); 'Torgrim' (1872); 'Sigmund Bresteson' (1872); 'Fraa Dansketidi' ('From the Times of Danish Rule,' 1875); 'Den Bergtekne' ('The Spell-Bound Fiddler,' 1876); 'Vore Bedsteforældre' ('Our Grandparents'); 'Paa begge Sider Havet' ('On Both Sides of the Ocean'); 'Præriens Saga' ('The Tale of the Prairie,' 1885); 'Sara' (1891); 'Jesus Sangene,' a collection of religious songs (1893), etc. 'Digte,' a collection of his writings, was published in 1911.

JANSON, Paul, Belgian advocate and politician: b. Herstal, 11 April 1840. He became well known for his speeches on social reform, was elected to Parliament in 1877 and in 1878 became a member of the Liberal Cabinet. His activities in behalf of universal suffrage caused a split in the Liberal party and in 1884 Janson lost his seat in Parliament. The party was reunited and Janson returned to Parliament in 1889. He revived the question of universal suffrage and secured its adoption 18 April 1893, but lost his seat in the following year. He was re-elected in 1900, became an active worker for equal suffrage and was prominent in the parliamentary discussion of the Kongo investigations in 1906. He was appointed State Minister in 1912.

JANSSEN, Cornelius (also **JANSEN** or **JOHNSON**), English portrait painter: b. London, 1593; d. 1664. After earnest effort for many years he was rewarded in 1618 by being made the fashionable painter at the court. He maintained his pre-eminence until Van Dyck came to England. Janssen went to Holland during the troubled years of the wars between Charles I and the Parliament. His work is of a refined order, finished with infinite care and all portray his powers as colorist. His scheme of throwing features into high relief by provid-

ing a dark background has never been excelled. His best portraits are those of Charles I, the Duke of Buckingham, John Milton as a boy, and 'The Magistrates.' Janssen is represented in many private collections and also in the collections of Rotterdam, Lille, Dresden and Brunswick.

JANSSEN, yän'sĕn, **Johannes,** German Roman Catholic historian: b. Xanten, Rhenish Prussia, 10 April 1829; d. Frankfort-on-the Main, 24 Dec. 1891. He was educated at the universities of Louvain, Bonn (1851–53) and Berlin, was professor of history in the Gymnasium at Frankfort-on-the-Main in 1854, became a priest in 1860 and domestic prelate to the Pope in 1880. He is chiefly known by a work in six volumes, published in 1876, and which subsequently went through 14 editions, entitled 'Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters' ('History of the German People from the Close of the Middle Ages to the Beginning of the Thirty Years' War 1618'). This work attained instant and great popularity among the German people, yet though its learning and thoroughness were not questioned, it was severely attacked by Baumgarten, Ebrard, Schweizer and others as being partial and unfair. A French translation of the first two volumes was published in Paris in 1887–88. Janssen's other works include 'Wibald von Stahlo und Corven' (1854); 'Frankreichs Rheingelüste und deutschfeindliche Politik in frühern Jahrhunderten' (2d ed., 1883); 'Schiller als Historiker' (2d ed., 1879); 'Zur Genesis der ersten Teilung Polens' (1865); 'Gustav Adolph in Deutschland' (1865); 'Frankfurts Reichskorrespondenz von 1376–1519' (1875; 4th ed., 1889); 'Friedrich Leopold, Graf zu Stolberg' (2d ed., 1882); 'An meine Kritiker' (1882); 'Ein zweites Wort an meine Kritiker' (1883), etc.

JANSSEN, Peter, German painter: b. Düsseldorf, 12 Dec. 1844; d. Berlin, 19 Feb. 1908. His father was J. Theodor J. Janssen, a noted engraver, and from him he obtained his early education; in his 16th year he entered the Academy at Düsseldorf and became a pupil of Bendemanns and Sohn. In 1877 he was appointed a professor in the Düsseldorf Academy, in 1895 its director, and in 1885 was elected a member of the Berlin Academy. In 1868 he painted his first great work, 'The Denial of Peter,' in the Academy at Philadelphia. In the same year he obtained first prize in a contest for decorating the walls of the Rathaussaal in Krefeld and completed this work in 1873. In the summer of 1872 he completed the colossal wall painting in the Bremen Exchange, 'The Colonization of the Baltic Coast.' In 1874 he decorated the walls of one of the rooms of the National Gallery in Berlin in wax colors, the painting taken from 12 subjects being entitled 'The Myth of Prometheus.' During 1880–82 he decorated the walls of the town hall at Erfurt with six large and three small paintings in wax colors entitled 'Momentous Episodes in the History of Erfurt.' These are noted for their brilliant color scheme and dramatic development. Other paintings by him are 'The Infancy of Bacchus' (1883), exhibited at the International Exhibition in Munich; 'Walther Dodde and the Peasants of Berg before the Battle of Worringen, 1288,' in the Düsseldorf Gallery, a picture that was awarded a gold medal at Berlin in 1893; 'The Battle at Fehrbellin' (1884); 'Nature,' 'Beauty,' 'Human Life' and 'Imagination' in the Aula of the Academy at Düsseldorf.

JANSSEN, Pierre Jules Cesar, French astronomer: b. Paris, 22 Feb. 1824; d. Meudon, 23 Dec. 1907. He was graduated in 1852 as licentiate in the mathematical sciences, and in 1860 as doctor of physical sciences, his graduating thesis, 'L'absorption de la chaleur rayonnante obscure dans les milieux de l'œil,' creating widespread discussion. In 1853 he became temporary professor in the Lycée Charlemagne, and from 1865 to 1871 was professor of general physics in the Special School of Architecture. In 1857 he went to Peru to fix the location of the magnetic equator; from 1861 to 1864 was in Italy observing the solar spectrum; and from the latter year until 1867 was in the Azores with Saint Claire Deville. In 1867 he went to Trani and in 1868 to Guntoor, India, to observe the total eclipse of the sun, making special spectroscopic observations on the protuberances. In 1870 he escaped in a balloon from Paris, then in a state of siege, in order that he might witness the Algerian obscuration; in 1874 watched the transit of Venus in Japan; in 1875 went as astronomer with the English expedition to Siam; and in the latter year was appointed director of the astrophysical observatory at Meudon, near Paris. In 1883 he was in the Caroline Islands. In 1891 he began his ascensions of Mont Blanc, and in 1892–93 founded an observatory there.

JANSSENS VAN NUYSSEN, zhän'sän, **Abraham,** Flemish painter: b. Antwerp, 1575; d. there, 1632. In early youth he showed remarkable aptitude for painting, and when 18 years of age became the pupil of Jan Snellinck. In 1601 he was admitted as a master into the guild of Saint Luke of which he was dean 1606–07; he then visited Italy. As a colorist he ranks next to Rubens among the Flemish painters of the 17th century; in correctness of drawing he excelled him, in treatment of the nude and in bold composition he equaled him, but in general freedom of disposition and touch and in faculty of color he fell far short. The most important of his paintings, which include biblical, allegorical and mythological subjects, are 'Madonna with Saints' and 'Entombment,' in the Carmelite church at Antwerp; 'Ecce Homo' and 'Descent from the Cross,' in the cathedral of Saint Bavon at Ghent; 'The Resurrection of Lazarus,' in the Elector Palatine's Gallery; 'Madonna,' 'Adoration of the Magi' and 'Scaldis,' in the Antwerp Museum; 'Venus and Adonis' and 'Day and Night,' in the Vienna Museum; 'Old Age Resting on Faith and Hope,' in the Brussels Museum; 'Meleager and Atalanta' and 'Vertumnus and Pomona,' in the Berlin Museum; 'Diana and Nymphs Watched by Satyrs,' in the Cassel Gallery, etc.

JANUARIUS, jăn-ū-ā'rĭ-ŭs, **Saint:** b. Naples or Benevento, Italy, 21 April 272; d. Pozzuoli, Italy, 19 Sept. 305. He became bishop of Benevento in 303 and at the time of the persecution of the Christians by Diocletian was beheaded. He is the patron saint of Naples. His body lies in the crypt of the cathedral at Naples; and two phials of his blood which a pious matron caught, according to tradition, at his execution, are preserved in a chapel in the south aisle. It is asserted that the blood lique-

fies on being brought near the head of the saint. A trial is made on three festivals of each year, the chief of which is the anniversary of the martyrdom, and also when public danger or calamity exists or is impending. It is believed that the patron saint is particularly propitious if the blood moves briskly in the phials and appears of a clear red, while the opposite is regarded as presaging some ill to the country.

JANUARY, the first month of the year, was by the Romans held sacred to Janus, from whom the name was derived. The Roman year originally began with March and consisted of only 10 months. Numa is said to have added January and February to the calendar; but although the Romans as early as 251 B.C. accepted January as the first month of the year, the nations of Europe did not universally adopt it as such till the 18th century. Wulfmonath was the Anglo-Saxon name for the first month. The 25th of March was the beginning of the ancient Jewish year, and that day, instead of 1 January, long held a legal position in Christian countries as the opening of the new year.

JANUS, jā'nŭs, an ancient Latin divinity, after whom the first month of the year was named. He was sometimes represented as a porter or keeper with a sceptre in the right hand and a key in the left, seated on a glittering throne; but was most commonly represented on the Roman *as* of the early coinage as having one head with two bearded faces, one looking forward and the other backward, and this latter image was set up under the arch in the Forum. Janus was called "father," his name was first invoked at the beginning of all solemn sacrifices and he was worshipped as the god of gods, the sovereign disposer of war and peace and the dispenser of the fortunes of mankind. By some he was regarded as the god of light and heaven — the sun-god, the supreme janitor in heaven and on earth, identical with Jupiter (q.v.) — who opened the gates of heaven to let out the day and closed them again upon the return of evening. Others held that all doors (*janua*) and all passages (*janus*) were under his care. The commencement of both the year, month and day were regarded as sacred to Janus. The temple of Janus, standing on the north side of the Forum near the curia, was in reality only two parallel arches facing east and west, connected by side walls and furnished with gates. According to an ordinance of Numa Pompilius these gates were to be opened at the beginning of every war and remain open until peace was established in every country subject to Rome, but during the long space of 700 years the gates were closed only three times. Consult Fowler, 'The Roman Festivals' (1899); Toutain, 'Etudes de Mythologie' (1909).

JANVIER, jăn'vĭ-ā, **Catharine Ann,** American painter and author: b. Philadelphia, Pa. She is the widow of T. A. Janvier (q.v.), whom she married 26 Sept. 1878. Her paintings include 'Geoffrey Rudel and the Countess of Tripoli'; 'The Princess Badroulbadour'; 'The Guitar Player'; 'Daniel at Prayer'; 'The Violinist,' etc. She has written 'Keramics for Students' (1880); 'London News' (1904); and has translated (from the Provençal of Félix Gras) 'The Reds of the Midi' (1896); 'The Terror' (1898); and 'The White Terror' (1900).

JANVIER, Margaret Thomson, American author, sister of T. A. Janvier: b. New Orleans 1844; d. February 1913. Under the pen-name "MARGARET VANDEGRIFT" she wrote many juvenile stories and verses, including 'Under the Dog-Star' (1881); 'Clover Beach'; 'Little Helpers'; 'The Absent-Minded Fairy, and Other Verses' (1883); 'The Dead Doll, and Other Verses' (1888); 'The Queen's Body-Guard'; 'Doris and Theodora'; 'Rose Raymond's Wards'; 'Ways and Means'; 'Holidays at Home'; 'Little Bell, and Other Stories'; 'Umbrellas to Mend,' etc.

JANVIER, Thomas Allibone, American author: b. Philadelphia, Pa., 16 July 1849; d. 18 June 1913. He received a common school education; was an editorial writer for the Philadelphia *Press, Bulletin* and *Times* in 1870–81; married and passed some time in Colorado, New Mexico and Mexico; lived in New York during most of the period 1884–94, and then made his residence in France and England. Among his works are 'Color Studies' (1885); 'The Mexican Guide' (1887); 'The Aztec Treasure House' (1890); 'Stories of Old New Spain' (1891); 'The Uncle of an Angel and Other Stories' (1891); 'An Embassy to Provençe' (1893), the chronicle of a European journey; 'In Old New York' (1894), popular historical sketches; 'In the Sargasso Sea' (1898); 'The Passing of Thomas, and Other Stories' (1900); 'In Great Waters' (1901); 'The Christmas Kalends of Provençe' (1902); 'The Dutch Founding of New York' (1903); 'Legends of the City of Mexico' (1910); 'From the South of France' (1912); 'At the Casa Napoleon,' with 'Memoir' by Hitchcock, R. (1914).

JAOK, a large sculpin, *Myoxocephalus jaok,* of the Bering Sea, used locally as a food fish. It is from 12 to 18 inches long, olive grayish above and white below, common in shallow waters along the Bering Sea coasts and into the Arctic. "Jaok" is the Kamchatka name for the fish. The "cottus jaok" of the Kamchatkas in these waters is also used as a food fish, and is known by various names, the Koriahs calling it "i laal," the Russian Kamchatkas "ramscha," the Kouriles "susiatki." It is reddish above and white below, about two feet in length and is said to live for two days out of water.

JAORA, India, a native state in the Malwa agency, Central India, comprising two separate tracts lying between Neemuch and Ratlam. The total area, which includes also the dependencies of Piplanda and Pant Piplanda, is 568 square miles. The head of the state is styled nawab, is of Afghan descent and of Mohammedan faith. In 1818 the native state was guaranteed its independence by the British under the Treaty of Mandsaur. The region is fertile and produces cotton, Indian corn, opium and several kinds of millet. The Malwa opium of commerce is largely produced in Jaora. The annual revenue is about $285,000, of which about $45,000 is paid as tribute. Pop. 84,200.

JAORA, India, town and capital of the native state of the same name, situated on the Rajputana-Malwa Railway, about 20 miles north of Ratlam. The town is regularly laid out and has several substantial buildings of modern construction. There are also a dispensary and a high school. The Zenana dispensary dates from the jubilee year of 1897. Pop. 23,850.

JAPAN (corruption of Marco Polo's *Zipangu*, native name *Dai Nippon*, or *Dai Nihon* [from *dai*, great; *ni*, sun; *hon*, root or rising], Land of the Rising Sun), island-empire lying off the northeast coast of Asia, long remarkable for the proud isolating policy of its rulers, and now claiming special consideration on account both of its recent renewed relations with the civilized world and of the wonderful changes that during the past 50 years have been in progress in the country. The following series deals with the real spirit of the past history of Japan and with the present condition of that empire under the following heads:

1. Topography of Japan.
2. Ethnology.
3. The Development and Constitution of Society in Japan.
4. Mental Characteristics of the Japanese.
5. History of the Empire to 1889.
6. History of Japan, 1889–1919.
7. The Japanese Constitution.
8. Foreign Relations.
9. The Samurai.
10. Education in Japan.
11. The Religions of Japan.
12. Japanese Language.
13. Japanese Literature.
14. History of Japanese Fine Art.
15. Japanese Architecture.
16. Finance and Coinage System of Japan.
17. Banking System of Japan.
18. Agriculture in Japan.
19. The Japanese Army.
20. The Navy.
21. Russo-Japanese War.
22. Diplomatic Relations with the United States.
23. Japan in the World War.

1. TOPOGRAPHY OF JAPAN. Along the Pacific coast of the Asiatic continent lies the archipelago of Japan, stretching from the southwest to the northeast. It consists of three large arcs, with their convex side turned toward the ocean. The principal arc, which is situated in the middle, consists of four large islands, namely, the main island of Hokkaido (called Yezo by Europeans), Honshu (often erroneously called Nippon), Shikoku and Kyushu. At both ends of the principal arc begin the other two arcs, Chishima (Kurile) and Ryukyu (Luchu), which are long series of small islands. Besides all these, two large islands have been recently added to this country, Taiwan (Formosa) in 1895 and the southern half of Karafuto (Sakhalin) in 1905. On the whole, the archipelago of Japan consists of six larger islands with the addition of many hundreds of smaller islands. The whole chain meridionally measures 29 degrees of latitude, extending between Vele Rete Rocks (21° 45′ N.) and Alaid Island in the Kurile Group (50° 58′ N.), while it longitudinally covers a comparatively narrow zone between Kwasho in the Hoko Group (119° 20′ E.) and Shimushu Island in the Chishima Group (156° 32′ E.). The area of the principal islands forming these arcs are as follows:

	Area (with annexed small isles), sq. m.
Honshu	86,524
Shikoku	7,011
Kyushu	15,543
Sado	334
Oki	130
Awaji	218
Iki	51
Tsushima	266
Ogasawara-jima	27
Ryukyu	932
Taiwan Group	
Taiwan (Formosa)	13,419
Hoko-to (Pescadores)	49
Hokkaido	
Main island or Hokushu (Yezo)	30,058
Chishima (Kurile)	6,137
Karafuto (Sakhalin) (estimated)	12,634
Total (without Karafuto)	160,699
Total (with Karafuto)	173,333

By the addition of Korea (q.v.) the area of the empire was increased 32 per cent, with a grand total of 260,738 square miles.

Partially enclosed by the principal central arc lies the Sea of Japan. This mediterranean sea is a deep depression, whose maximum depth is near the northeast coast of the Korean Peninsula. The northern end of this sea is connected by the narrow passage of Mamiya Strait or the Gulf of Tartary, with the Sea of Okhotsk, a fairly deep depression partially enclosed by the Chishima arc. Passing through Tsushima Strait, another outlet of the Sea of Japan, we come to the China Sea, which is merely shallow water on a great continental shelf, along the edge of which runs the Ryukyu arc. The warm Japan Current or Kuroshiwo washes the southwestern coast of the archipelago, while the cold Chishima Current flows along the northeastern coast. Tsushima Current, a branch of the former, enters the Sea of Japan and affords moisture and warmth to the northwestern coast of Honshu. Liman Current, one of two smaller cold currents along Karafuto, flows southwest near the coast of the Asiatic continent.

Generally speaking, the archipelago is very mountainous and its topographic features are highly complicated. The crustal movements of the earth have generated large mountain systems, which are again separated into several ranges. Some of these ranges are nearly 10,000 feet in height and exhibit landscapes of Alpine character. Moreover, owing to these terrestrial disturbances, we find many volcanic chains, which are arranged mostly along but sometimes across the principal trend of the archipelago. Many of the lofty peaks in this country are the magnificent cones of volcanic origin. Plains could not develop to any great extent in such a land. They are found occasionally along seacoasts as well as along the banks of large rivers. Comparatively well-developed plains are found in delta districts, which are generally fertile and densely populated. Also in mountain districts we meet some basins, sometimes with lakes nestling in their centres. Rivers in Japan are naturally short and are mostly torrents, thus giving everywhere scenic beauty as well as water power for industrial purposes. The stony deltas of these torrents are frequently formed at the base of mountains on the coast. The coastal line is generally well developed, more so along the Pacific coast than along the coast of the Sea of Japan. Every island is indented with innumerable bays and inlets, surrounded by rocky bluffs and sandy beaches. Thousands of isles and rocks are scattered near the coast, especially in the famous Seto-uchi or Inland Sea, which stretches between the three large islands, Honshu, Shikoku and Kyushu and is connected by very narrow straits with the Pacific Ocean and the Sea of Japan. The highest development of a coastal line may be seen along the shore of Kyushu, which measures 5.0 miles in area to every mile of coast line, while Honshu measures 4.6, Shikoku 3.8, Hokushu 2.3, and the lowest, Taiwan, 1.8. The topography of each principal island in detail follows.

Honshu.— The fundamental form of Honshu, the main island, is outlined by two great mountain systems, which are called the northern and the southern arc. The two systems meet in

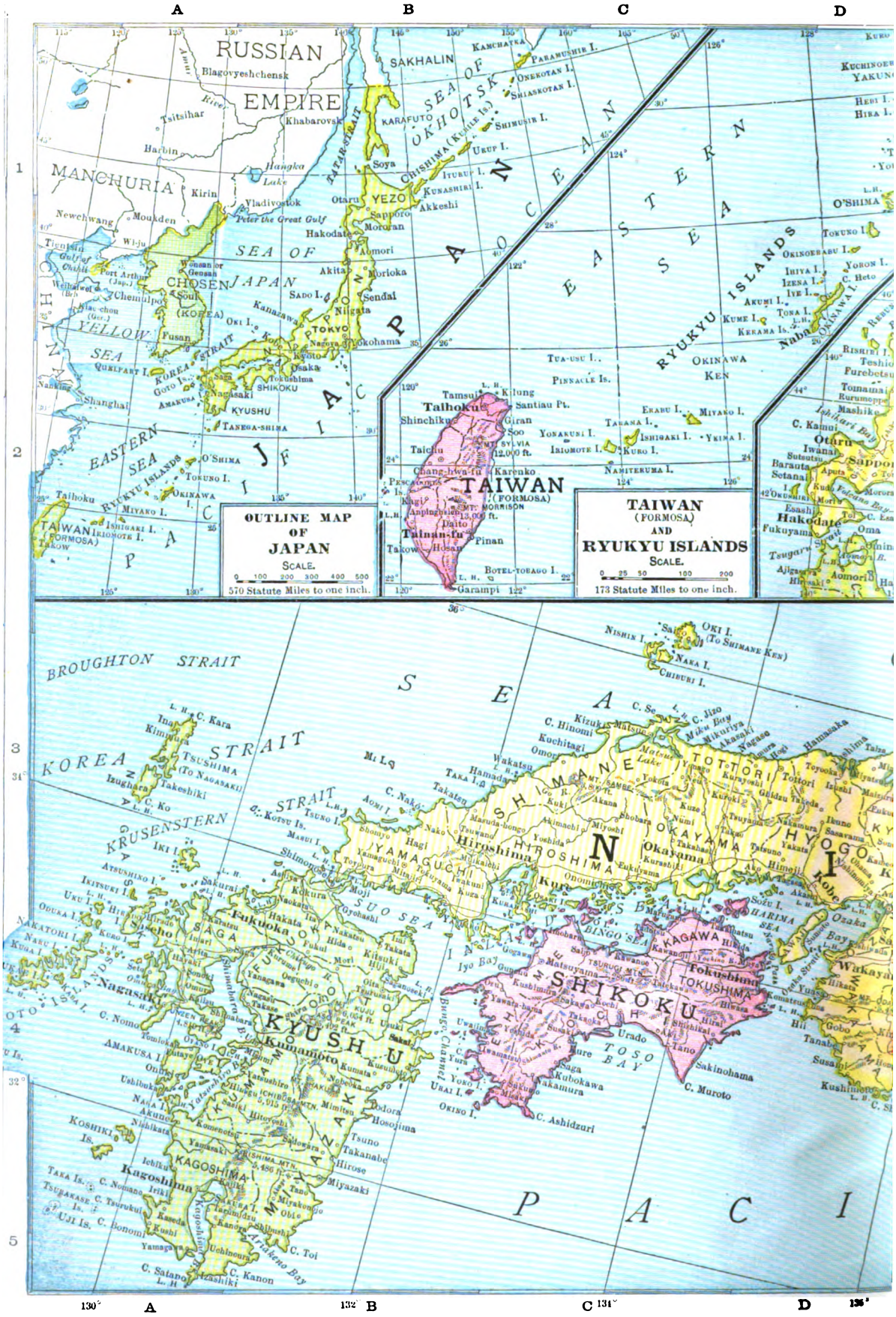
the central part of the island forming a syntaxis or «Schaarung» where lies the great volcanic chain of Fuji. The northern arc, which is often called the Sakhalin system, is quite a large system and consists of several parallel ranges whose northern extension passes through Hokushu, the main island of Hokkaido, to Karafuto (Sakhalin). These ranges run nearly north and south but their southern portion gradually tends to the southwest. In the northern half of Honshu or northern Japan there are three ranges, separated from each other very distinctly by depressions of low plains. The central range begins on the shore of the Gulf of Mutsu. It runs south, forming the backbone of northern Japan as well as the watershed between the Pacific Ocean and the Sea of Japan. Geologically the range shows the later formations of the Tertiary Period, accompanying a few exposures of Archæan and Palæozoic formation. Moreover, this range is a series of volcanic cones, forming the Nasu volcanic chain. Some of the cones exceed 7,000 feet in altitude. At the northern extremity of the Nasu volcanic chain stands Osore-yama (2,572 feet) on the north coast of the Gulf of Mutsu. The chain runs south through such volcanoes as Yatsukoda-san (5,153 feet), Ganju-san (6,790 feet), a gigantic volcanic cone of North Japan, Koma-ga-take (3,834 feet), Sukawa-dake (5,435 feet), Zao-san (6,442 feet), Adataro-san (4,658 feet), Adzuma-yama (6,294 feet), Bandai-san (6,442 feet), Nasu-san (6,271 feet), and turns to the southwest and then west through Takahara-yama (5,881 feet), Nantai-zan (8,144 feet), the principal peak of the Nikko Group, Hiuchi-dake (7,813 feet), Akanagi-yama (7,511 feet), Nikko Shirané (7,504 feet), Akagi-san (6,209 feet), Haruna-san (4,779 feet) and Asama-yama (8,134 feet). Some of these are still active. The great eruption of Asama-yama in 1783 and the explosion of Bandai-san in 1888 were most remarkable.

The second range, which runs parallel to the central range and along the coast of the Sea of Japan, is of similar geological formation to the first. These ranges are separated from each other by a series of low lands such as the valleys of the sister rivers Omono and Mogami, the basins of Yonezawa, Aidzu and Inawashiro, etc. The range is divided into two parts by the gorge of Mogami. The northern half, which is composed mostly of hills or low tablelands, is generally comprised under the name of Dewa-hill. The southern half is very mountainous and is called the Echigo Mountain Range. Asahi-dake (7,032 feet) and Iidé-san (6,232 feet) are the prominent peaks of the granite mass in this range. The southern prolongation of the range stretches between the Aidzu basin and Echigo plain and terminates in Mikuni Range.

A volcanic chain runs parallel to this western range. Commencing at Iwaki-san (5,209 feet), it passes through Moriyoshi-yama (4,769 feet), Chokai-zan (6,964 feet) and Gassan (5,944 feet). Chokai is well known because of its gigantic proportions and therefore this chain takes the name of this volcano. The coastal line of the Sea of Japan is mostly flat and unbroken. Its monotony is disturbed only by the volcanic peninsula of Oga, which encloses the shallow waters of the lagoon Hachiro-gata. The plain of Echigo on the same coast is one of the largest plains in the country

The third range running along the Pacific Coast east of the central range differs from the other two in several respects. It consists of such older geologic formations as Archæan, Palæozoic and Mesozoic, associated with various kinds of old eruptive rocks. Topographically it forms no continuous chain as does the central range, and it is divided into the two spindle-shaped mountain groups, Kitakami and Abukuma. The Kitakami group on the north is sharply separated from the central range by the tectonic valleys of Mabechi and Kitakami. Its external features show no regularity as a mountain system, which can be observed merely in its inner stratified structure. The network of numerous valleys extending in various directions, which have resulted from erosion, divide the district into an irregular group of mountains and hills. Hayachiné, the highest peak, measures about 6,560 feet. The coast of this region is not so smooth and flat as the coast of the Sea of Japan, but it is in many places very deeply indented with numerous small inlets of the «Rias» type, such as Miyako, Kamaishi, Onagawa, etc., affording vessels protected anchorages. Near Oshika Peninsula on the south, separated from the mainland by a narrow passage of water, is the granitic island of Kinkazan, whose lofty peak is the sailor's landmark. Waveworn Matsushima, a group of a hundred small islands in the Bay of Sendai to the west of Oshika Peninsula, is noted for its beautiful scenery.

Another mountainous region, lying between the Pacific Ocean and the tectonic valley of Abukuma, is commonly called the Abukuma Plateau. This is a broad mountain mass, and consists of an extensive area of gneiss and crystalline schists with a narrow zone of coal-bearing strata of Tertiary formation along the coast. The abrasion was much greater here than in the Kitakami Mountainland. The Ancient mountain system with its complex strata is now reduced to an undulating plateau, whose greatest elevation scarcely exceeds 3,300 feet. The southern extension of this plateau forms the small ranges of Yamizo and Naka, which gradually sink into the plain of Kwanto. At the extremity of the latter stands an isolated mountain called Tsukuba-san (2,850 feet); on one of its summits the well-known meteorological observatory was established some years ago by H. I. H. Prince Yamashina. Another extension of the northern arc toward the southwest forms the mountain blocks or «Scholle» of Ashio and Kwanto or Chichibu, which form the north and northwest boundaries of Kwanto-plain. The Kwanto group is a square mass of the older geological formations. On the west it terminates abruptly in the tectonic valley of Chikuma-gawa and in the basin of Kofu, and on the east in the plain of Kwanto. Some celebrated mountains of this group are Buko-zan (4,297 feet), Kobushi-daké (8,062 feet), and Kimpu-zan (8,367 feet). The great volcanic district of Kenashi and Iwasuge with the extinct volcanoes of the same names lies between the Kwanto group on the south and the Mikuni group on the east. The volcanic chain also stretches to the south until it joins the Nasu volcanic chain at Asama-yama.


A
B
C
D
RUSSIAN EMPIRE
Blagovyeshchensk
Khabarovsk
Tsitsihar
Harbin
MANCHURIA
Kirin
Hangka Lake
Vladivostok
Peter the Great Gulf
Newchwang
Moukden
Wi-ju
Tientsin
Gulf of Chihli
Port Arthur (Jap.)
Weihaiwei (Brit.)
Chefoo
Liao chou (Gov.)
Chemulpo
Soul
CHOSEN (KOREA)
Fusan
YELLOW SEA
Quelpart I.
Nanking
Shanghai
EASTERN SEA
O'Shima
Tokuno I.
Taihoku
Miyako I.
Ishigaki I.
Iriomote I.
TAIWAN (FORMOSA)
Takow
Okinawa
Amakusa
Nagasaki
SHIKOKU
KYUSHU
Tanega-shima
Kobe
Osaka
Tokushima
Kyoto
Nagoya
TOKYO
Yokohama
Niigata
Kanazawa
Oki I.
Sado I.
Sendai
Morioka
Akita
Aomori
Hakodate
Mororan
Sapporo
Otaru
YEZO
Akkeshi
Soya
Hokkaido
SEA OF JAPAN
TATAR STRAIT
KARAFUTO (SAKHALIN)
KAMCHATKA
Paramushir I.
Onekotan I.
Shiaskotan I.
Shimushir I.
Ukup I.
Chishima (Kurile Is.)
Iturup I.
Kunashiri I.
SEA OF OKHOTSK
PACIFIC OCEAN
EASTERN SEA
RYUKYU ISLANDS
Kume I.
Kerama Is.
Tua-usu I.
Pinnacle Is.
Okinawa Ken
Erabu I.
Miyako I.
Tarama I.
Ishigaki I.
Ykima I.
Iriomote I.
Kuro I.
Namiteruma I.
Tamsui
Kilung
Santiau Pt.
Giran
Soo
Yonakuni I.
Taichu
MT. SYLVIA 12,000 ft.
Chang-hwa-fu
Karenko
TAIWAN (FORMOSA)
MT. MORRISON 13,000 ft.
Anpinghsien
Daito
Tainan-fu
Pinan
Takow
Hoban
Botel-tobago I.
Garampi
OUTLINE MAP OF JAPAN
SCALE.
0 100 200 300 400 500
570 Statute Miles to one inch.
TAIWAN (FORMOSA) AND RYUKYU ISLANDS
SCALE.
0 25 50 100 200
173 Statute Miles to one inch.
Yokohama
Nagoya
Kyoto
Osaka
Kobe
Hakodate
Otaru
Sapporo
Aomori
Morioka
Sendai
Niigata
Kanazawa
Fusan
Nagasaki
Kumamoto
Kagoshima
Takamatsu
Matsuyama
Tokushima
Kochi
Hiroshima
Okayama
Tottori
Shimane Lake
Shimane
Hyogo
Kagawa
Ehime
Yamaguchi
Fukuoka
Saga
Oita
Miyazaki
Kagoshima
Nagasaki
Kumamoto
Sasebo
Moji
Shimonoseki
Kure
Wakayama
Osaka Bay
Harima Sea
Bingo Sea
Iyo Bay
Suo Sea
Tsugaru Strait
Broughton Strait
Korea Strait
Krusenstern Strait
Sea of Japan
Pacific
Oki I.
Nishin I.
Naka I.
Chibubi I.
Tsushima (To Nagasaki)
Iki I.
Goto Is.
Amakusa I.
Koshiki Is.
Taka Is.
Tsukarase Is.
Uji Is.
Tanega-shima
Yakushima
Osumi Is.
Tokara Is.
Amami-o-shima
Oshima
Tokuno I.
Okinoerabu I.
Yoron I.
Okinawa I.
Kume I.
Miyako I.
Ishigaki I.
Yaeyama Is.
Yonaguni I.
Hokkaido
Rishiri I.
Teshio
Furebetsu
Tomakomai
Mashike
Otaru
Iwanai
Sutsutsi
Barauta
Setana
Esashi
Hakodate
Fukuyama
Oma
Aomori
Hachinohe
Kushimoto
Sakinohama
C. Muroto
C. Ashidzuri
Urado Bay
Toso Bay
Tosa Bay
Kii Channel
Bungo Channel
Naruto Strait
Kitan Strait
Awaji I.
Sumoto
Wakayama
Osaka
Kobe
Himeji
Akashi
Harima
Tokushima
Takamatsu
Marugame
Sakaide
Zentsuji
Kochi
Tosa
Susaki
Shimanto
Uwajima
Yawata
Saga
Kubokawa
Sakamura
Okino I.
Urai I.
Hirado
Sasebo
Nagasaki
Omura
Isahaya
Shimabara
Kumamoto
Yatsushiro
Hitoyoshi
Kagoshima
Ibusuki
Kushikino
Sendai
Miyazaki
Nobeoka
Hoscojima
Takanabe
Hirose
Tsuno
Kushimoto
Obi
Aburatsu
Kanoya
Kushikino
Izashiki
C. Kanon
C. Toi
C. Satano
C. Bonomi
C. Nomano
C. Tsurukui
Arikawa Bay
Kagoshima Bay
Ariake Bay
Yatsushiro Bay
Omura Bay
Hizen Bay
Matsushima Bay
Mikuriya Bay
Ise Bay
Mikawa Bay
Suruga Bay
Sagami Bay
Tokyo Bay
Kii Bay
Wakasa Bay
Toyama Bay
Kaga Bay
Noto Peninsula
Kii Peninsula
Izu Peninsula
Boso Peninsula
Shimoda
Hamamatsu
Nagoya
Gifu
Kofu
Nagano
Matsumoto
Takayama
Fukui
Kanazawa
Toyama
Niigata
Maebashi
Takasaki
Utsunomiya
Mito
Tokyo
Yokohama
Kawasaki
Chiba
Kisarazu
Yokosuka
Hachijo I.
Oshima
Miyake I.
Mikura I.
Niijima
Kozu I.
Shikine I.
Toshima I.
Izu Is.
Bonin Is.
Volcano Is.
Iwo Jima
Kita Iwo Jima
Minami Iwo Jima
Mt. Fuji 12,365 ft.
Mt. Asama 8,300 ft.
Mt. Ishizuchi 6,500 ft.
Mt. Aso 5,102 ft.
Mt. Kirishima 5,456 ft.
Mt. Ichifusa 5,013 ft.
Mt. Sakurajima 3,665 ft.
Mt. Hakusan 8,737 ft.
Mt. Ontake 10,467 ft.
Mt. Yatsugatake 9,840 ft.
Mt. Nantai 8,200 ft.
Mt. Nikko 8,200 ft.
Mt. Tsukuba 3,793 ft.
Mt. Haruna 5,900 ft.
Mt. Myoko 7,900 ft.
Mt. Iwaki 6,300 ft.
Mt. Chokai 7,000 ft.
Mt. Hayachine 5,600 ft.
Mt. Iwate 6,600 ft.
Mt. Hakkoda 5,400 ft.
Mt. Tokachi 7,500 ft.
Mt. Yotei 6,000 ft.
Mt. Poroshiri 6,000 ft.
Mt. Asahi 7,500 ft.
Mt. Daisetsu 7,500 ft.
Mt. Rishiri 5,600 ft.
Mt. Yubari 6,000 ft.
Mt. Shokambetsu 6,000 ft.
Mt. Tarumae 3,500 ft.
Mt. Komagatake 3,500 ft.
Mt. Usu 2,500 ft.
Mt. Yakedake 4,000 ft.
Mt. Kuju 5,800 ft.
Mt. Aso 5,102 ft.
Mt. Unzen 4,500 ft.
Mt. Kirishima 5,456 ft.
Mt. Ichifusa 5,013 ft.
Mt. Sakurajima 3,665 ft.
Mt. Hakusan 8,737 ft.
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Mt. Iwaki 6,300 ft.
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Mt. Hayachine 5,600 ft.
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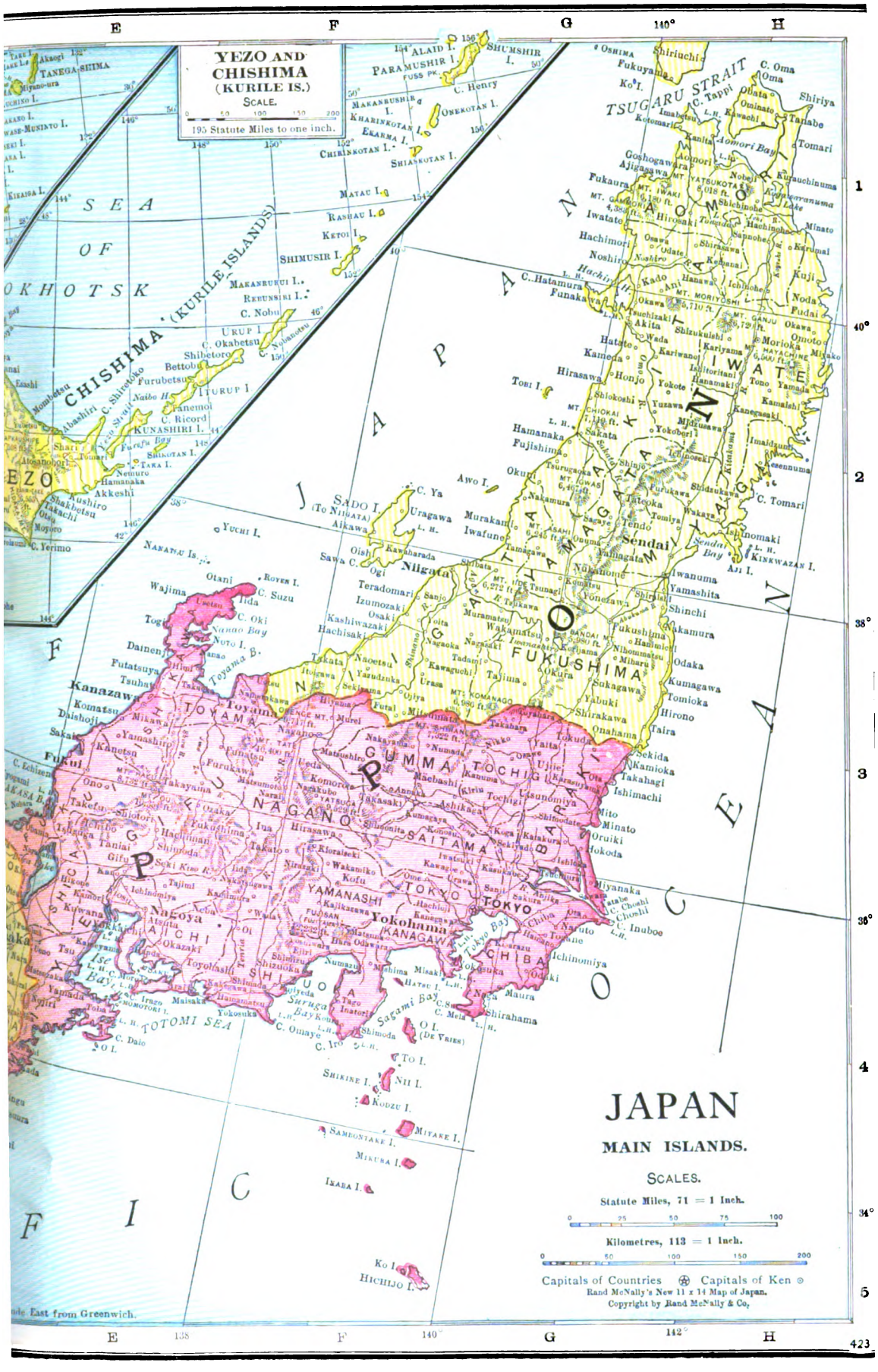
Mt. Hakkoda 5,400 ft.
Mt. Tokachi 7,500 ft.
Mt. Yotei 6,000 ft.
Mt. Poroshiri 6,000 ft.
Mt. Asahi 7,500 ft.
Mt. Daisetsu 7,500 ft.
Mt. Rishiri 5,600 ft.
Mt. Yubari 6,000 ft.
Mt. Shokambetsu 6,000 ft.
Mt. Tarumae 3,500 ft.
Mt. Komagatake 3,500 ft.
Mt. Usu 2,500 ft.
Mt. Yakedake 4,000 ft.
Mt. Kuju 5,800 ft.
Mt. Aso 5,102 ft.
Mt. Unzen 4,500 ft.
130°
132
131°
138°


YEZO AND CHISHIMA (KURILE IS.)
SCALE.
195 Statute Miles to one inch.
JAPAN
MAIN ISLANDS.
SCALES.
Statute Miles, 71 = 1 Inch.
Kilometres, 113 = 1 Inch.
Capitals of Countries ⊕ Capitals of Ken ⊙
Rand McNally's New 11 x 14 Map of Japan.
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SEA OF OKHOTSK
JAPAN SEA
PACIFIC OCEAN
TSUGARU STRAIT
CHISHIMA (KURILE ISLANDS)
YEZO
HONSHU
SHIKOKU
KYUSHU
AOMORI
IWATE
AKITA
MIYAGI
YAMAGATA
FUKUSHIMA
NIIGATA
TOYAMA
ISHIKAWA
FUKUI
NAGANO
GUMMA
TOCHIGI
SAITAMA
TOKYO
KANAGAWA
YAMANASHI
SHIZUOKA
AICHI
GIFU
MIE
OSAKA
HYOGO
KYOTO
SHIGA
TOTTORI
OKAYAMA
HIROSHIMA
YAMAGUCHI
TOKUSHIMA
KAGAWA
EHIME
KOCHI
FUKUOKA
SAGA
NAGASAKI
KUMAMOTO
OITA
MIYAZAKI
KAGOSHIMA
Sapporo
Hakodate
Aomori
Akita
Morioka
Sendai
Yamagata
Fukushima
Niigata
Kanazawa
Toyama
Fukui
Nagano
Maebashi
Utsunomiya
Mito
Yokohama
Tokyo
Kofu
Nagoya
Shizuoka
Tsu
Otsu
Kyoto
Osaka
Kobe
Wakayama
Tottori
Matsue
Okayama
Hiroshima
Yamaguchi
Tokushima
Takamatsu
Matsuyama
Kochi
Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Naha
Hichijo I.
Ko I.
Ikeda I.
Mikura I.
Miyake I.
Kodzu I.
Nii I.
To I.
Oi (De Vries)
Rebunsiri I.
Shimusir I.
Matsu I.
Rashau I.
Ketoi I.
Urup I.
Iturup I.
Kunashiri I.
Shikotan I.
Taka I.
Habomai Is.
Chirinkotan I.
Ekarma I.
Shiashkotan I.
Onekotan I.
Kharinkotan I.
Makanrushir I.
Paramushir I.
Alaid I.
Shumshir I.
Tanega-shima
Yakushima
Amami-Oshima
Tokara Is.
Oki Is.
Sado I.
Awo I.
Toni I.
Izu Is.
Ogasawara Is.
Volcano Is.
Daito Is.
Sakishima Is.
Yaeyama Is.
Miyako Is.
Tsushima
Iki I.
Goto Is.
Amakusa Is.
Tanega-shima
Yakushima
Amami-Oshima
Tokara Is.
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Volcano Is.
Daito Is.
Sakishima Is.
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Iki I.
Goto Is.
Amakusa Is.

Kusatsu-Shirané (7,498 feet) and Adzumaya-san (7,731 feet) are well known in this chain.

The plain of Kwanto, the largest in the country, stretches between the Kwanto group and the Pacific Ocean. On the south it extends as far as the two hilly peninsulas, Boso (Awa-Kadzusa) and Miura, which enclose the Bay of Tokio, an outshoot of the Pacific. The plain is gently undulating, partly of Tertiary formation, but mostly covered by later deposits. It is drained by many streams, of which Toné is most noted. Lakes and lagoons are numerous, and Kasumi-ga-ura near the mouth of the Toné is the second greatest lake of Japan. The plain is well cultivated and thickly populated. There are over 40 cities and towns with populations of over 10,000. Tokio, the capital of Japan, with its population of over 2,030,000, is situated on the mouth of the Sumida River, which flows into the Bay of Tokio. At a distance of only 19 miles from the capital is Yokohama, the greatest seaport in the country, and a little south is Yokosuka, one of Japan's naval ports. Many towns in the northern part of the plain are noted for their flourishing silk industry.

In the central part of Honshu, where the two great mountain systems meet, lies a zone of great tectonic depression, which is represented by the valley of Chikuma-gawa on the east, and those of Fuji-kawa and Kamanashi-gawa and the lowlands of Matsumoto-daira on the west. Along this zone runs the volcanic chain of Fuji and many cones stand as the boundary posts separating the two topographical districts, Northern and Southern Japan. The chain originates in the far south in the Marianna Group in the Pacific Ocean; and running north through the Volcano Group (Iwo-jima) and Shichito Group, it reaches the peninsula of Idzu on the south coast of Honshu. Several eruptions on these volcanic islands and of the submarine volcanoes have been recorded in recent years. Noteworthy among these is Oshima or Vries Island, which is now active. The Idzu Peninsula with Amagi-san (4,546 feet) is linked with Honshu by the Hakoné, which is well known for its large and beautiful atrio-lake. Ashi-no-ko, as well as many hot springs. Next to Hakoné and over Ashitaka stands the prominent cone of Mount Fuji, whose snowclad peak reaches the height of 12,392 feet. The chain tends toward northwest and north and passing through Kaya-ga-take (4,067 feet), Yatsu-ga-take (9,637 feet), Tateshina-yama (8,298 feet), it terminates at the Myoko Group (Myoko-zan, 8,049 feet) on the coast of the Sea of Japan.

The southern arc of Honshu was first described as a part of the Sinian System by Pampelly and then as a part of the Kuenlun System by Loczy, both considering it as a single system and an extension of Nan-ling or of Peling (Tsin-ling) on the Asiatic continent respectively. But Baron von Richthofen in a recent opinion says that it consists of two different mountain systems, which unite in southern Japan; one chain on the coast of the Sea of Japan, which he names Chugoku Mountain being probably an extension of the Kuenlun System or Tsin-ling, while the other, which runs along the Pacific Coast and is called the Kuma-kii Range, belongs to the mountain system of southern China or Nanling. Without going into further discussions of these tectonic problems, we will turn our attention to the general topography of southern Japan.

Between the tectonic valleys of Fuji-kawa and Tenryu-gawa lies the Akaishi Mountain, which from its outline is often called Akaishi Sphenoid. It is composed of several ranges of various geological formations. The highest peak of the Akaishi proper reaches the altitude of 10,145 feet, while the culminating peak of the whole group with a height of 10,332 feet is in the Shiramine Range, which runs parallel to the Akaishi proper on the eastern side of the Oigawa Valley. The northern extension of the Shiramine joins a granitic mass with the precipitous peaks of Koma-ga-take (9,843 feet) and Ho-o-zan (9,551 feet). The southern extension of the Akaishi Range forms the mountain districts of Totomi and Mikawa, and disappears in the Akumi Peninsula.

Nearly parallel to the Akaishi Mountain, and between the two great valleys of Tenryu and Kiso, extends the Kiso Range with another Koma-ga-take (9,446 feet). This range joins the mountainlands of Mikawa in the south. The spurs of these mountains form a terraced coastal plain which is mostly grass-plain or "Hara," such as Takashi-ga-hara, Mikata-ga-hara, etc. The lowlands at their base are well cultivated and contain many towns and villages, through which runs the trunk line of the Tokio-Kobé Railway. Many large rivers such as the Fuji, the Abé, the Oi and the Tenryu flow toward the south, cutting deep valleys in the Akaishi Mountain and its spurs, and forming stony deltas on this coastal plain. On the plain is Lake Hamana, which is now connected with the sea by a narrow outlet.

Coming back to the great tectonic valley of Fuji-Kamanashi, we find the small basin of Suwa with the lake of the same name. It lies 2,600 feet above sea-level and is the source of the Tenryu. Further to the north, separated from this basin by the small ridge of Shiojiri-togé, stretches the valley of Matsumoto-daira with an average height of 1,500 feet. Rising precipitously from this level the lofty Hida Range forms the western boundary of the valley. This range extends south to the right side of the great Kiso Valley, and the north end of it terminates abruptly in the precipitous cliff of Oyashirazu on the Sea of Japan. This is the highest mountain range in the empire with many peaks of 10,000 feet in altitude, and hence it is often called the "Japanese Alps." There is no glacier in this range at present, but the striated surface of the rocks of Shirouma-ga-take, one of the prominent peaks, indicates the former existence of one. Like the Akaishi Range, it consists of older geological formations and various eruptive rocks. Among several peaks Yari-ga-také (10,142 feet) or the "Matterhorn of Jajan," Hodaka-yama (10,168 feet), Jonenbo-daké (10,168 feet), Otenjo-daké (10,447 feet), Shirouma-ga-také (9,624 feet) are the most celebrated. The size and importance of this range is still further increased by its junction with the Norikura volcanic chain. The two largest volcanoes of this chain, Ontake (10,447 feet), and Norikura-ga-daké (10,385 feet), are next in height to Mount Fuji. Tateyama is a lofty group including Tateyama proper (9,630 feet) and Ken-ga-mine (about 9,840 feet)

closely parallel to the western side of the northern Hida Range and separated from it by the great gorge of Kurobe-kawa.

The western flank of the whole Hida Range is not so steep as the eastern, but slopes to the mountainland of Hida, sometimes called the Hida Plateau. This comprises a wide tract of the most mountainous district in Japan, which spreads over the province of Hida and a part of Mino and Etchu. In its centre there is the small basin or "Becken" of Takayama. To the north of this mountainland lies the fertile plain of Toyama, along the coast of the deep Toyama Bay, an arm of the Sea of Japan. Jindzu-gawa and Imidzu-gawa drain this mountainland and then flow through the plain. The western border is a high ridge, upon which stands the volcano Haku san (8,659 feet). The range slopes gradually through a hilly region to a narrow belt of the coastal plain along the Sea of Japan. The province of Noto is a large peninsula on this coast, with Nanao, an excellent harbor. The coastal plain is thickly populated and there are such cities as Kanazawa, the seat of an old "Daimyo," and as Fukui, famous for its silk manufacture.

On the south of the Hida Mountainland stretches the low lands of Mino and Owari. It is a part of the great depression, whose southern half is now occupied by the Isé-no-umi, an arm of the Pacific. The Mino-Owari plain is drained by the three rivers, Kiso-gawa, Nagara-kawa and Ibi-kawa. It is extremely fertile and produces rice of an excellent quality. Nagoya is a flourishing commercial and industrial city and also an important railway junction in this plain. This plain is bounded on the west by the range of Ibuki, Yoro and Suzuka. On the further west, there is a series of such depressions separated from each other by north and south "Horst" ranges, which finally come to the great depression of the Inland Sea or Setouchi.

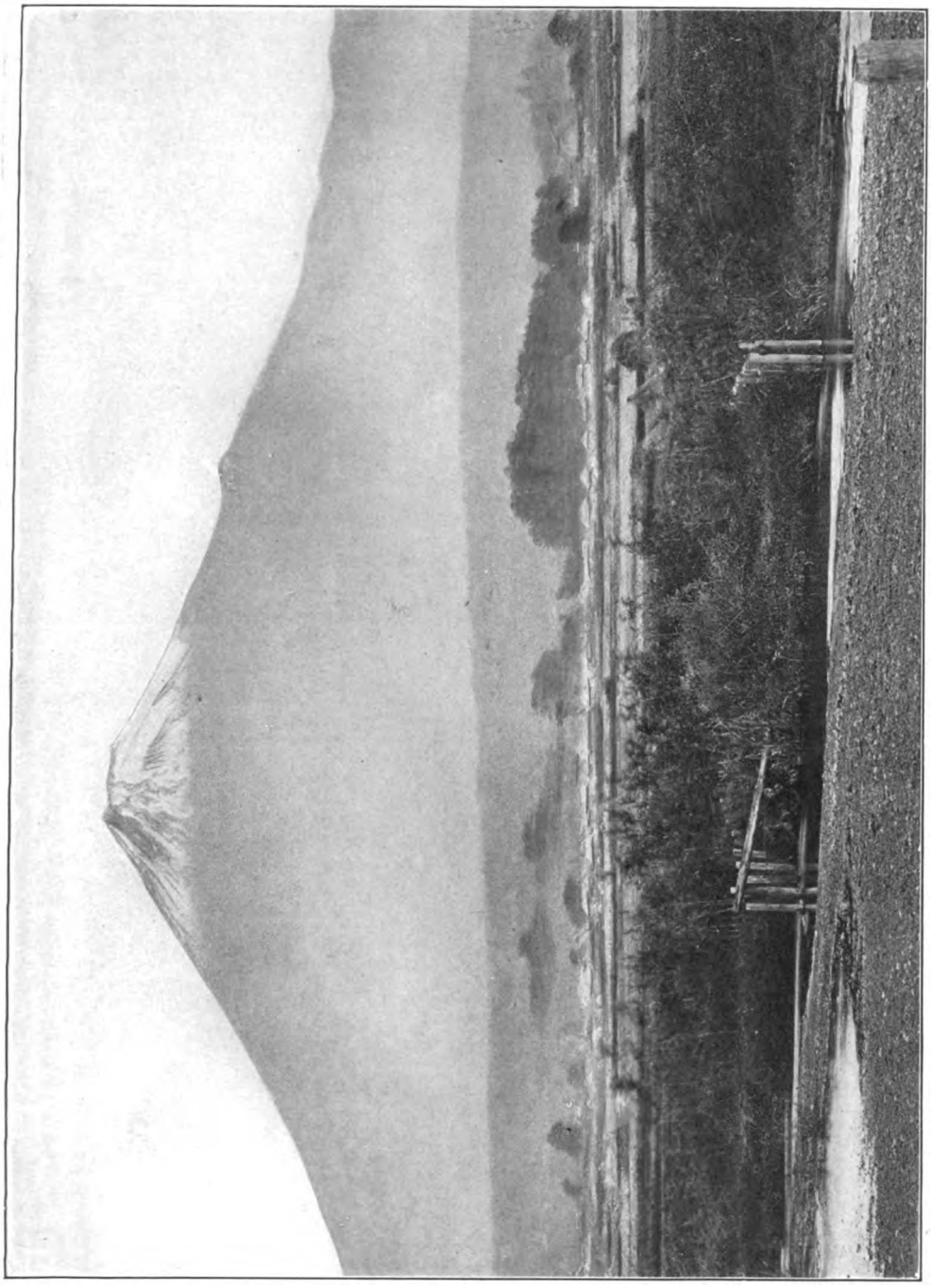
Next to the Mino-Owari plain and between the "Horst" Yoro and Hiei-Kasagi, there lies the depression of the province of Omi, the greatest part of which is occupied by Lake Biwa, the most picturesque and largest fresh-water lake in Japan. The waters of the Sea of Japan cut deep into the land, forming Tsuruga Bay, and there is only a narrow tract of land between this bay and Lake Biwa. Iga is a small basin to the south of the former. On the southwest of Omi Basin there are the basins of Yamashiro and Yamato. There was, however, originally a single depression between Hiei-Kasagi (Hira-san 4,044 feet, Hieizan, 2,700 feet), and Kongo (4,057 feet) mountains which was afterward divided into the two basins by the undulating hills of insignificant height between them. These basins have played an important rôle in the history of Japan. The basin of Yamato was the seat of the capital of the Nara dynasty, 1,000 years ago, and there still remain many buildings, especially ancient Buddhist temples. In the centre of the basin of Yamashiro is situated the city of Kioto, which was the capital of Japan for a thousand years until Tokio was made the new metropolis in 1868. The city which is often called the "Paris of Japan," is well known for its scenic beauties and its many old magnificent palaces and temples, and it is also noted for its artistic and industrial wares, especially various kinds of silk, embroideries, porcelains and cloisonné ware.

On the other side of Kongo-horst lies the plain of Settsu, which sinks into Osaka Bay on the west. The Yodo River drains Lake Biwa, and passing through both the plains of Yamashiro and Settsu, it discharges into Osaka Bay Lying at its mouth, Osaka was for centuries a commercial centre of Japan and at present it is a flourishing industrial city. It is the second largest city of Japan with its population of over 1,380,000. Kobé has an excellent harbor on the shore of the bay and is the largest importing port, especially cotton, in the empire.

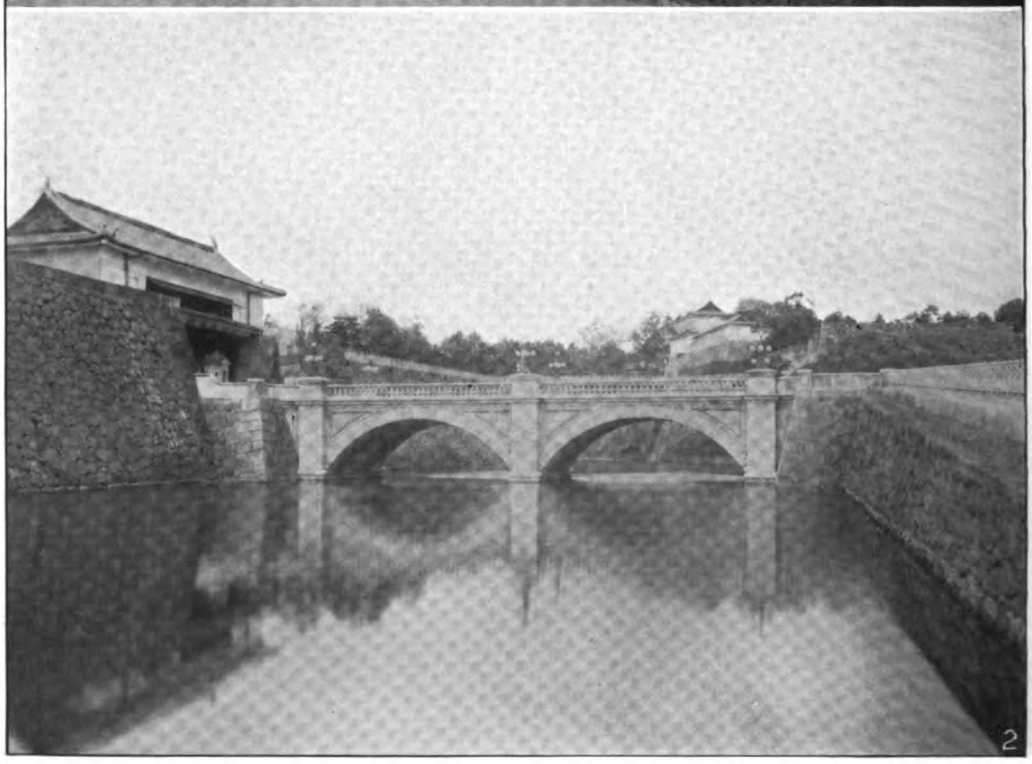
On the south of this framework of "Horsts" and depressions lies the large peninsula of Kii. It is bounded by the Idzumi Range, whose highest point is Katsuragi-san (2,814 feet). Ki-no-kawa flows in the valley at the southern foot of this range. The peninsula is very mountainous. Especially on the eastern side of Kumano-gawa, a deep transversal valley, the range attains a considerable height in many peaks of the Omine Group (culminating point is 6,153 feet) and Odaiga-hara-san (5,527 feet). These mountains are nothing but an extension of the noted Akaishi Range. The range dips down into the Sea of Ise at the peninsula of Akumi; but, reappearing in Shima Peninsula on the opposite coast of the sea, it extends westward with an increasing magnitude and height. Several geological formations from an old crystalline schist to the Tertiary are exposed in the successive zones from north to south. The continuity of this system may well be traced in the island of Shikoku through Kii Strait.

On the other hand, the palæozoic mountainlands of Tamba lie north of the Yamashiro and Settsu basins. They occupy an extensive area of older formation, like the Hida Plateau, but not so high and inaccessible. On the north of these mountainlands is the wide Bay of Wakasa, its coast indented with many small inlets. On this bay are Maidzura, a naval port, and also Amano-hashidaté, noted for its beautiful scenery.

The western part of Honshu forms the large peninsula of Chugoku. It is almost entirely mountainous with a few plains along the coast and rivers. The mountains, however, scarcely exceed 4,000 feet in height, with the few exceptions of some volcanoes, which form a volcanic chain through the northern half of this district. Dai-sen (6,157 feet), Sambe-yama (4,025 feet) and Aono-yama are the most celebrated volcanoes. The earlier geological formation of Chugoku is greatly disturbed by the eruption of granite and other igneous rocks, which are now widely exposed throughout this district. Rivers are generally short, and there are only a few noteworthy ones such as Gono-kawa running into the Sea of Japan, Higashi-no-Okawa, Nishi-no-Okawa, Kawabe-Kawa and Ota-gawa flowing into the Inland Sea of Setouchi. The coastal lines on both sides of this district show great contrasts. Along the Sea of Japan the coast is very poor with bays and islands. There is one independent range, the Shinji, forming a peninsula of Shimane, which is separated from the main land by the Lagoon Naka-no-umi, Lake Shinji and the low plain of Kidzuki. The south coast of



Fujiyama, from Tokaido Road



1 Government Offices, Fuku

2 Modern Bridge and Entrance to the Imperial Palace, Tokio

Chugoku is quite different. It faces Setouchi on the Inland Sea. This peculiar sea is a zone of depression having Chugoku on one side and Shikoku and Kyushu on the other. It is divided into several «Nada» or seas by groups of thousands of islands which now remain as detached elevations in this depressed zone. On the east, Awaji, the «Horst»-island separates the Osaka Bay from Harima-nada. Midzuchima-nada, Bingo-nada, Aki-nada and Suonada lie to the west. They are generally very shallow and in most parts do not exceed 20 fathoms in depth. The only portions where great depths are found are the narrow passages at the outlets of the sea, where the bottom is acted upon most effectively by the erosion of tidal currents.

The coastal line of Chugoku is highly developed on the shore of Setouchi. Numerous inlets cut into the land, and there are many good harbors and anchorages. Among them the Bay of Hiroshima is one of the best, with the city of the same name on its shore, and Ujina, its harbor, which was the headquarters of transport ships in the recent wars. Not far from Ujina, and on the coast of an arm of Aki-nada, is the naval port of Kuré with its large docks and arsenal. Itsuku-shima or Miyajima, situated in Hiroshima Bay, is noted for its beautiful scenery.

Shikoku.— As a whole this great island is a single mountain group of southern Japan. It is separated from Chugoku by the Inland Sea, while a great depression forms the large Bay of Tosa on the south, bounded by the two promontories, Muroto and Sada (Ashizuri), projecting southward into the Pacific. Kii Strait on the east and Bungo Channel on the west, cut off Shikoku from Kii Peninsula and Kyushu Island. There is a great similarity between the mountain formations of Shikoku and the others. Shikoku Range, which extends east and west through the island, is a continuation of the mountains in Kii Peninsula and Kyushu Islands. The greater part of the island is very mountainous, and there are several lofty peaks, such as Tsurugi-san (7,354 feet) and Ishidzuchi-san (6,878 feet). The northern part of Shikoku, from which the two great peninsulas of Takanawa and Sanuki project into the Inland Sea, is very similar in its geological and topographical features to the Chugoku and Setouchi islands. The peninsula of Sanuki is nothing but a recently elevated tract of the same sea. Many isolated granite mountains and hills, like islands, stand on the low plain. Among many rivers, Yoshino-gawa is most noted. In its upper course it flows eastward, forming a valley in the Shikoku Range, then cutting through the range it forms the famous gorge of Oboké and Koboké and turns again eastward parallel to the range, flowing through a wide plain until it empties into Kii Channel. Other noted mountain rivers are Shimanto-gawa, Niyodo-gawa and Monobe-kawa, which flow into the Bay of Tosa. A peculiar development of the coastal line on the western side of the island shows many elongated peninsulas and promontories, such as Sada-no-misaki. Awa-no-naruto, situated in the narrow strait between Shikoku and Awaji is very remarkable on account of its terrible whirlpools, which are caused by tidal currents.

Kyushu.— This is the third largest island in Japan with its topographical and geological features very complicated in many respects. The coastal line, especially in its northern part, is more highly developed than any in the country. The Kyushu Range, which is a continuation of the Shikoku Range, passes obliquely through the southern half of the island. It culminates on the boundary between the two provinces of Higo and Hiuga with several high peaks, such as Ichibusa-yama (5,970 feet), Ishido-yama (5,724 feet) and Mikuni-yama (5,396 feet). Hitoyoshi-basin is an enclosed basin in this range. The well-known river of Kuma-gawa flows from Ichibusa-yama, and passing through that basin cuts this range again forming a picturesque gorge through which it flows into the Sea of Yatsushiro. Further south, there stretch the two great peninsulas of Satsuma and Osumi, forming the shores of the beautiful Bay of Kagoshima. The geological formation of these peninsulas is mostly mesozoic combined with the other deposits by Kyushu Range; but its surface is covered to a great extent by ejecta of volcanoes, there having been several violent eruptions in recent ages. Kirishima-yama is situated between Satsuma and Osumi, and is one of the most celebrated active volcanoes in Japan. Karakuni-daké (5,661 feet) and Takachiho-nominé (5,064 feet) are magnificent cones in the Kirishima Group. The volcanic chain of Kirishima commences in this group, and runs south through Sakura-jima, the volcanic island (3,749 feet) in the Bay of Kagoshima, well known for its terrible eruption of 1914, and Kaimon-daké (3,041 feet), a perfect cone at the extremity of Satsuma Peninsula. The further extension of this chain passes through the volcanic islands of Kawabé Shichito (Seven Islands of Kawabé), some of which are active at present.

In the northern part of Kyushu on the other hand, there lies the so-called Tsukushi Mountain, which is a mountain group of various geologic formations, ancient and recent, as well as of plutonic and volcanic rocks. There is no regularity in the mountain formation and the whole region is divided into many mountains and hilly tracts, the heights rarely exceeding 3,300 feet, except in the case of some volcanic cones. An extreme development of the coastal line forms the peninsulas of Sonoki and Shimabara, which are connected with the main body by the narrow isthmus of Isahaya. Omura Bay and Ariaké Bay are separated by these peninsulas from the sea. There are many excellent harbors on this coast. Nagasaki, a beautiful inlet of «Rias» type, was first opened for Chinese and Dutch merchants, and centuries ago it was known as the only port for foreign trade. Now it has a large dockyard and is a commercial centre of southern Japan. Sasebo is a good naval port. Many good anchorages are also found on the northern coast. Fukuoka, with Hakata harbor in its neighborhood, is one of the most flourishing cities of Kyushu, situated on the beautiful Bay of Hakata. Moji, situated in the extreme north of Kyushu and along the Strait of Shimonoseki, has had a rapid development during the past few years, as an export harbor for coal, which is abundantly produced in the Tertiary hills of the Tsukushi Range in the provinces of Chikuzen and Buzen. Wakamatsu, southwest of Moji, is also a coal

harbor, and near this town are the Imperial Iron Works of Yawata.

Between Tsukushi Range and Kyushu Range there lies a great volcanic mass, whose ejecta cover an extensive area in the central part of Kyushu. Aso-san in this group is a remarkable active volcano. The diameter of its outermost craterwall is 17.5 miles by 12.5 miles; perhaps it is one of the greatest in the world. Surrounded by this wall is a large crater plain and in its centre stand five volcanic cones, among which Taka-daké is the highest (5,543 feet). To the northeast of the Aso proper stretches the Aso volcanic chain. In this chain there are the volcanic groups of Kuju-san (6,100 feet) next to that of Aso, Yubu-daké (5,517 feet), and Tsurumi-daké (4,890 feet) near the shore of Beppu Bay, and the circular peninsula of Kunisaki with the volcano Futago (2,430 feet). The further extension of the chain may be traced to some small islands in the Inland Sea. Another continuation of this chain in the opposite direction is indicated by Kibo-zan (2,326 feet) in Kumamoto Plain and Unzen-ga-také (4,871 feet), on Shimabara Peninsula. To the north of the latter there is another volcano Tara-daké (1,226 feet).

A comparatively wide plain extends along the shore of Ariaké Bay. It is divided into two parts by the hilly region of Miiké. The northern plain is drained by Chikugo-gawa, the largest river of Kyushu, and is thickly populated. Higo Plain on the south has in its centre the city of Kumamoto. This plain is extremely fertile and produces rice of the best quality. There are many islands near Kyushu. On the west there are the twin islands of Amakusa, Koshiki and Goto Group, while on the north Iki and Tsushima form the stepping stones between Japan and Korea.

Ryukyu.—All the islands stretching between Kyushu and Taiwan (Formosa) are comprised under the name of Ryukyu Group. But politically the northern group of these islands belongs to Kyushu. These islands are nothing but the peaks of a submerged mountain ridge along the edge of the continental shelf. Geologically the arc of Ryukyu is divided into three zones. The islands in the central zone are mostly of older geologic formations, while those in the outer zone are of the later Tertiary period. The inner zone is of the volcanic origin, and is the continuation of the Kirishima volcanic chain of Kyushu. Okinawa-jima, the largest island, is situated in the centre of this group. Most of the islands are hilly, with the exception of Yaku-shima with a granite mountain Yaku-daké (6,183 feet).

Taiwan (Formosa).— This spindle-shaped island is at the southern extremity of the Empire and lies next to the province of Fokien of southern China from which it is separated by the Taiwan Channel. The slight development of the coastal line characterizes this island, there being no large indentations. Kelung, the gate to this island on its northern end, is but a small "Rias," harbor. The backbone of Taiwan begins with a precipitous cliff on the northern coast, and stretches W. S. W. for some distance, then turns to S. S. W. at Setsu-san (Mount Sylvia, 12,641 feet). From this lofty peak the range runs along the length of the island, until it terminates at Garampi or the South Cape. It culminates at Niitaka-yama or Mount Morrison (14,268 feet), the highest mountain of Japan. This range consists of Palæozoic and Archæan formations and slopes abruptly on its eastern side. Sharply separated from this range by a tectonic valley, another small range (the Taito), stretches north and south along the eastern coast. Parallel to the west side of the central range lie spurs of a later geological formation with a lower altitude. Along its foot extends a strip of the coastal plain, where the soil is remarkably fertile, and sugarcane and rice are cultivated. A characteristic feature of this plain is the excellent development of the deltas of many rivers, which, leaving the mountain region, suddenly discharge their water and silts into the plain. Taihoku, the metropolis of the island, is situated in a small basin at the northern end, through which the Tamsui River flows, having Tamsui harbor at its mouth. The hilly tract around this basin is well known for its tea plantations. On the north of the same basin stands the volcanic group of Taitonzan (2,145 feet).

Hoko-to, or Pascadore Islands, are a group of small islands in Taiwan Channel. They are of basalt, with an insignificant altitude above the sea. The main island of Hoko-to has Mako, an excellent shelter harbor.

Hokkaido.— Hokusu, the main island of Hokkaido, or Yezo, as it is called by Europeans, is the second great island of Japan. It is rhombic in its general outline with the coast mostly level and low, and with a peninsula of fish-tail shape on the southwest. The continuation of the volcanic chains in northern Honshu extends into this peninsular part. The large bay of Uchiura, or the Volcano Bay, commands an excellent view of various volcanoes on its coast. On the south of the bay is Koma-ga-také, to the southeast of which stands the active volcano of Esan. There are many volcanoes, especially in the region to the north of the bay. Makkarinupuri or Shiribeshi-yama (6,873 feet), which is situated at the centre of that volcanic region, is noted for its perfect cone. Other volcanoes are Usu, Tarumaye, etc.

The backbone of the main part of Hokushu consists of older rocks and passes through the island in a S. S. E.— N. N. W. direction from Cape Erimo to Cape Soya. The southern half of this range is called Hidaka Mountain, the Yubari Range running parallel to it along its western side. At the centre of this backbone stand many peaks, most of which are of volcanic origin. Among these prominent peaks, Nutapkaushibé (7,691 feet), Oputateshiké (6,494 feet), and Tokachi-daké (5,943 feet) are well-known volcanoes, and Ishikari-daké (6,675 feet) consisting of older eruptive rocks, is also noted for its high altitude. The Chishima volcanic chain runs east, from Nutapkaushibé, including several volcanic cones, such as Meakan (5,304 feet), Oakan (4,950 feet), Atosa-nupuri, and Raushi-yama (5,160 feet).

Seaward from these elevations stretches a gently undulating hilly region through which many large rivers flow, such as Ishikari-gawa, Teshio-gawa, Tokachi-gawa, etc. Fertile plains are found along these rivers. The largest plain in the island is that of Ishikari, which separates the main body of the island from its peninsular part and penetrates further north-

ward into the mountain district along the river Ishikari. Kamikawa is a basin at the upper course of that river. Sapporo, the political centre of this island, is situated in the plain of Ishikari, and Otaru, its flourishing harbor, lies at a short distance from it.

Chishima or Kuriles.—This group of islands stretches from the Bay of Nemuro to the southern extremity of Kamchatka Peninsula, describing a large arc forming the eastern boundary of the Sea of Okhotsk. These islands are entirely of volcanic origin, accompanying Tertiary strata in some islands. The three great islands, Kunashiri, Etorofu and Uruppu, lie to the northeast of the main island of Hokkaido in the order named. These islands have been explored but little and are very sparsely populated.

Karafuto (Sakhalin).—The island of Karafuto stretches from east to west with the meridian of 142° 30′ E. as its axis. This island is now politically divided into two parts by the parallel of 50° N., Japan possessing its southern half. There are two peninsulas at the southern end of Japanese Karafuto which form the coast of Aniwa Bay. Kushunkotan (Korsakof), the political centre of the island, is a harbor situated at the northern end of this bay. Another large bay, which is called Terpenia Bay, lies on the eastern coast. The principal mountain chain, the Sakhalin Range, commences at Cape Notoro at the southern extremity of the island, forming a continuation of the backbone of Hokkaido, from which Karafuto is separated by the narrow channel of Soya. This range is of the later geological periods, like to the northern Hokkaido, and generally it consists of gently undulating hills. There are neither precipitous mountains nor abruptly elevated lofty peaks. The highest mountain, Spamberg, does not exceed 3,300 feet in height. Susuya and Tako rivers flow in opposite directions along the eastern foot of the range, forming a valley which extends north and south. On the other side of this valley the Susuya Range stretches along the eastern peninsula. There older geological formations are exposed, which may be the continuation of the same strata in Hidaka Range of Hokkaido. Along Susuya River there is an alluvial plain where Vladimirovka, the principal town, is situated. In the middle part of the island a similar topography is found. A large river valley formed by the Poronai and the Tym separates the Tiora Mountain Range on the east from the Sakhalin Range. Poronai River rises in the Russian territory and flows across the boundary line. There is a plain along the most of its course until it flows into Terpenia Bay. Some tundra or barren lands are found on its upper course.

Climate.—As the archipelago of Japan extends over 29 degrees of latitude, different parts of the country have different climates, though there prevails an oceanic climate in general. In Taiwan and Ryukyu tropical and subtropical vegetations flourish, while in Karafuto and Chishima severe Arctic cold is experienced. The mean annual temperature is 75.7° F. (24.3° C.) in Koshun, a town in the southern extremity of Taiwan, and is over 68° F. (20° C.) in all islands of Ryukyu Group. In the greater part of Kyushu and Shikoku the mean temperature is 59° F. (15° C.). The Setouchi coast of Chugoku is warmer than the coast of the Sea of Japan in the same peninsula. In the mountainlands of central Honshu, as well as in the provinces of northern Honshu, the temperature becomes gradually lower and averages 50° F. (10° C.), while a milder climate is always experienced on the Pacific coast. In Tokio, it is 56.8° F. (13.8° C.) and in Yokohama 57.6° F. (14.2° C.). In Hokkaido the climate is generally cold. In most towns, except those in the southern peninsula, the annual temperature ranges between 39° F. (4° C.) and 44° F. (7° C.). Karafuto and Chishima are of course still colder. Mean annual temperature of Shisuka in Karafuto is 30.4° F. (—0.9° C.). August is the hottest month in most of the country, with the exception of Taiwan and southern Ryukyu, where the mean temperature in the month of July reaches over 80° F. (27° C.). February is the coldest month in Taiwan, Ryukyu and some parts of southern Japan, as well as on the coast of the Sea of Japan, while in other parts January is generally colder. The mean maximum temperature exceeds 86° F. (30° C.) in most of Japan, and the minimum reaches 22° below zero F. (—30° C.) in Asahigawa and Obihiro in Hokkaido, 40° below zero F. (—40° C.) in Ochiai in Karafuto).

Having the Asiatic continent on one side and the Pacific Ocean on the other, the most of the archipelago is included in the monsoon region. In winter, when the continent is extremely cold and the highest atmospheric pressure is attained, severe northwest and north winds prevail throughout the country. In summer, however, when the continent is heated and there is a low atmospheric pressure, warm and wet winds blow from the S. and S. W., that is, from the Pacific Ocean. Naturally there are several kinds of local winds, due to the complicated configuration of the land. Violent hurricanes or so-called typhoons (Taifoons), which occur mostly during the last of the summer and in the first of the autumn, cause terrible damage, especially to rice crops. They arise generally in the neighboring sea of Taiwan, and passing over Ryukyu and Kyushu, strike the Sea of Japan. Sometimes they pass further to the east through central Honshu. Typhoons from another source are said to come from the southern sea and suddenly strike the Pacific coast of central Japan.

The rainfall is of course abundant in the islands of Japan. The southern islands experience an extraordinarily great amount of rain. At Kelung in Taiwan, the annual precipitation is 130.6 inches, and in Oshima of Ryukyu Group 129.5 inches, while in Hachijo Island 153.5 inches. As a high mountain range runs along the axis of the main islands, a greater rainfall is caused on the coast of the Pacific Ocean during the summer than in the winter, while in the regions along the Sea of Japan the reverse is true. In these regions, except Hokkaido and northern Honshu, the rainfall exceeds 78 inches annually. In Tokio it is 59.0 inches. The least rainfall occurs in Hokkaido and Karafuto, though there it is not less than 27 inches, and in most of the island it amounts to 40 inches or over. In the beginning of the summer, when the summer monsoon commences, the southern and central regions of

Japan are generally cloudy and have many rainy days, though the whole amount of the precipitation is not exceedingly great. Heavy rains fall, oftener in storms, at the end of the summer in the same districts, and they cause inundations of many rivers, inflicting great damage on rice-fields and hindering communication in several directions.

It is an astonishing fact that an enormous amount of snow falls on the northern coast of central Japan. Prevailing cold winds from the northwest bring the moisture of the Sea of Japan, especially that of the Tsushima current, a branch of the warm Kuroshiwo or Japan current, and deposit it in the form of snow on the barrier of the high mountain range. It is difficult to believe that the depth of snow on the plains is at least three feet and in the mountain districts is sometimes more than 10 feet during the winter season. This is a real fact, however; whole towns and villages are often nearly buried under the snow, which is cleared away only with great difficulty.

Mineral Wealth.— The chief mineral products of Japan are coal, copper, gold, silver, iron, antimony, petroleum and sulphur. Among these minerals, coal stands as the most valuable product. Over 20,000,000 tons of coal are annually produced, one-fifth of which is exported. The richest coal-fields are located in the northern mountains of Kyushu and in the Yubari Range of Hokkaido. Coal occurs also on the Pacific coast of Abukuma Plateau of Honshu. Most of the Japanese coalmeasures belong to the Tertiary formation. Copper plays the most important rôle among metal productions, and Japan ranks as one of the chief sources of copper in the world. The annual average of its export is estimated to be over 76,000,000 pounds, or two-thirds of the total production. The celebrated copper mines are Kosaka, Ashio and Hitachi in the northern Honshu and Besshi in the island of Shikoku. Precious metals, however, are not quite so abundant. Gold occurs both in veins and in alluvial deposits. It is produced mostly in the province of Satsuma in Kyushu and in northern Taiwan. The gold mines of the island of Sado in the Sea of Japan have been known for centuries. Silver is obtained in several localities, but the principal mines are Kosaka and Hitachi in northern Honshu. A mine of antimony at Ichinokawa on the northern coast of Shikoku is well known for its mineralogical importance on account of its magnificent crystals of antimony glance. The celebrated iron mine of Kamaishi is on the Pacific coast of Kitakami mountainland in northern Honshu. Iron is not produced in sufficient quantities to supply domestic demand. Much ironware is imported from Europe as well as iron ore from China and Korea. The production of petroleum is annually increasing. In 1914 about 94,320,000 gallons of crude oil were obtained. Oil fields stretch along the coast of the Sea of Japan mostly in the Tertiary hills. The most productive wells are found in the province of Echigo. Sulphur is produced in several volcanoes. The quantity of precious stones found in Japan is insignificant. The only ornamental stones are quartz and agate. Topaz occurs in some places. Among building stones granite is most popular. It is quarried abundantly in southern Honshu. Its Japanese name "Mikagé-ishi" was derived from the name of a quarry near Kobé on the coast of Osaka Bay. Andesite and tuff are other important building materials. Good porcelain-clay is obtained in several places throughout the country.

Flora and Fauna.— It is true, to a certain extent, that Japan is poor in land flora and fauna, as it consists of groups of islands separated from the continent. The empire, however, extends from the tropical nearly to the frigid zone, and approaches the continent so closely at several points, that the species of the Asiatic continent are apt to be introduced very easily into the nearest islands. Consequently, the islands are comparatively rich in number of species, which closely resemble those of the continent.

Flora.— The whole island of Taiwan is practically tropical in nature, with luxuriant vegetation, as the name "Formosa" implies. Of the plants growing on the plains, the betel-nut palm (Areca catechu), the banyans (Ficus retusa and F. wightiana), the Pandanus (P. odoratissima), the bamboo, and the tree-fern (Cyathea spinulosa) are the principal ones. The most important of the cultivated plants are rice, sugarcane, the tea plant, the sweet potato and the ananus. The camphor tree (Cinnamomum camphora), the king of the Formosan forest, grows in woods on somewhat elevated ground, attaining 10 feet in diameter and 130–160 feet in height.

Kyushu, Shikoku, and a quarter of Honshu, south of the parallel 35° N., present some semi-tropical features, with several species of the oaks (Quercus glauca, Q. myrsinæfolia, etc.) and the pines (Pinus Thunbergii and P. densiflora). The stately growth of the woods of P. Thumbergii on the sand dunes gives magnificent scenery everywhere along the shores of this region. The tea plant and the wax tree (Rhus saccedanea) are extensively cultivated.

In that part of Honshu which is north of the parallel 35° N., there are found the forest trees of the temperate zones. The beech (Fagus sylvatica), "Onara" (Quercus grosseserrata), and the horse-chestnut (Aesculus turbinata) abound, often found with such species of conifers, as "hinoki" (Chamæcyparis obutosa), "sawara" (Ch. pisifera), the arbor vitæ (Thujopsis dolabrata), "sugi" (Cryptomeria japonica), and the fir-tree (Abies firma). The mulberry tree and the lacquer tree (Rhus vernicifera) are planted abundantly. Here is found also the Ginkgo tree, a primitive conifer, indigenous to Japan, Korea and China.

These three central islands with their semi-tropical and temperate characteristics are the most thickly populated and most thoroughly cultivated of the whole country; so the plains and valleys are mostly covered with fields of rice and barley.

Hokkaido and Karafuto may be grouped together as belonging to the subarctic zone. In this zone, the air (Abies sachalinensis), the spruce (Picea ajanensis), and the larch (Larix leptolepis), are the chief trees in the forests. The birches (Betula), the alders (Alnus), and the poplars (Poplus) are found with these in some places. Thus, the general features are very much like those of Siberia or the northern part of North America.

In Taiwan and the central Honshu, where great elevations occur, vertical zones of flora may be traced, which very nearly coincide with the horizontal zones just mentioned, although the same species are not always represented in the proper zones.

It may be assumed that the coasts of the Sea of Japan are generally poor in the marine flora, while the coasts of the Pacific are rich in the number of species as well as of individuals. On the southern Pacific side, where Kuroshiwo or the Japanese current passes close to the shore, many species of the red algæ, Sargassum and Ecklonia adorn the submarine rocks and cliffs; while on the northern Pacific coast, which the cold currents wash, Laminaria and Alaria grow abundantly. Alaria fistulosa nearly 300 feet in length is not rare.

Fauna.—The land animals of Taiwan are also semi-tropical. Among the mammals, the pangolin (Manis dalmani), with its relatives in India and Africa, is well known; the black bear (Ursus formosanus), the wild boar (Sus taivanis), and the deer (Cervus Swinhonii) belong to species different from those of the central Japan. Out of about 200 species of birds known in this island, four-fifths are similar to those of India and China, while one-half are similar to those of Japan proper. The most useful domestic animal is the bison (Bos chinensis), which is used for plowing and also supplies meat, hides and horns to the natives. Swine are bred everywhere in the islands as also in China.

Kyushu, Shikoku and Honshu may be grouped in one faunal zone; for there is scarcely any marked line to divide them into two zones, as in the case of plants. Most of the important groups or families of animals of the temperate continent are likely to be found in this region. Among the mammals, the hares (Lepus brachyurus and L. variabilis), the wild boar (Sus leucomystax), the deer (Cervus sika), the fox (Canis japonica), "tanuki" (C. procyonoides), the otter (Lutra vulgaris), "itachi" (Putorius itatsi), and the bear (Ursus japonicus) are the principal ones. Of the birds, wild ducks (Anas), the pheasant (Phasianus versicolor), and the snipes (Scolopax) attract sportsmen. The bush warbler (Cettia cantans), and the white eye (Zosterops japonica) are common caged birds. The long-tailed fowl of the province of Tosa in Shikoku deserves notice. The most remarkable facts concerning the fauna of Japan are that the monkey (Inuus speciosus) lives far north at Aomori (41° N.), and the giant salamander (Megalobatrachus maximus) survives in the mountain streams of the western Honshu. It is also an interesting fact that the wild cat and the Chinese ring-necked pheasant (Phasianus torquatus) are found in the island of Tsushima, which is considered to be a stepping stone between the continent and central Japan in the migration of animals. Of domestic animals, horses and cattle are most common. The small silkworm (Bombyx mori) is most important economically.

The fauna of the islands north of the Tsugaru Strait is of a different character, as is also the flora. The black fox (Canis alpinus), the sea otter (Enhydra lutris), the marten (Mustela brachyura), the brown bear (Ursus arctos), and the leopard seal (Phoca fœtida) are common in this zone. The fur seal (Callorhinus ursinus), which migrates in winter to the sea off Choshi or the Tsushima Strait, breeds in summer on the rocky shores of the Chishima (Kuriles) and the Robben Island off Cape Patience in Karafuto. The gray-headed green woodpecker (Gecinus canus), the great black woodpecker (Picus martius), Blackiston's eagle owl (Bubo blackistonii), and the hazel grouse (Tetrao bonasia) are also peculiar species. The Tsugaru Strait, though only 10 miles wide, most clearly divides the islands of Japan into two zones. This fact was first announced by Blackiston of Hakodaté, in whose honor the boundary is called "Blackiston's line."

In high mountains such as are found in Taiwan and central Honshu, alpine species are often observed. The most remarkable of these are the common ptarmigan (Tetrao mutus), and Japanese alpine accentor (Accentor alpinus, erythropygius).

The fishes in the seas of Taiwan are very similar to those in the seas of the Malay Archipelago, India and eastern Africa. "Sabahi" (Chanos chanos) are bred in large numbers in ponds on the west coast of the island. In the seas around the three central islands, there are many peculiar species, although some resemble those of the Chinese and Indian seas. Bonito (Thynnus pelamys), Tunny (Thynnus thynnus), the Spanish mackerel (Scomber colias), the snapper (Pagrus major), the sardine (Clupea melanostica), and the anchovy (Engraulis japonicus) are economically most important. The seas of Hokkaido and Karafuto, and a greater part of the Sea of Japan contain fishes of a subarctic nature; and the species found there are often similar to those of North America and occasionally to those of northern Europe. The herring (Clupea pallasii), the cod (Gadus brandtii), and the dog salmon (Onchorhychus keta) are economically most important. "Ayu" (Plecoglossus altivelis) and "Shirauwo" (Salanx) are fishes characteristic of Japan and Korea. The viviparous surf-fishes (Ditrema) and "Chika" (Hypomesus) are confined to Japan and North America. "Rabuka" (Chlamydoselachus anguineus) often caught off the Tokio Bay, being a primitive shark, is famous throughout the whole world. The culture of the pearl oyster (Avicula martensii), and the artificial method of depositing pearls in the shells which is practised at Shima on the coast of the Sea of Ise, are worthy of notice.

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2. ETHNOLOGY. The limit of a nation and that of a race do not necessarily coincide. While a nation may consist of two or more racial elements, one and the same division of a race may be found in different countries. We see both cases exemplified in the people of Japan. Extending from the Kurile islands and the southern half of Saghalien in the north to Formosa in the south, the empire naturally contains several racial elements. Though some of them are peculiar to the land, others are the small branches spreading from the main stems of peoples which are to be found in other countries.

Besides these existing populations we must count among the inhabitants of Japan the prehistoric people, who have left innumerable stone-age objects throughout the greater part of the country. Thus from ethnological points of view, Japan is remarkable for containing peoples of exceedingly different character in a comparatively limited area. We will now describe the constituent people under respective headings.

Prehistoric Stone-Age People.— Stone implements and potteries found in the northern portions of the Kurile islands and those found in Formosa were evidently made by the forefathers of the present inhabitants of those places. Relics of different types and of different kinds have been discovered from several stone-age sites widely distributed in the lands lying between Loo-Choo and the southern portions of the Kurile islands and Saghalien. As these relics form a group by themselves, and as no connecting links exist between them and those found in the two extreme places above mentioned, we are led to the conclusion that there must have been a stone-age people differing both from the aborigines of Formosa and from the Kurile Ainu.

From shell mounds — the refuse heaps left by the stone-age people — human bones are sometimes found often broken and scattered, like the bones of wild animals, showing that cannibalism was practised by the people. As it is very difficult to obtain entire skeletons, special burial places being almost unknown, the knowledge of the osteological character of the people is very limited. The only conclusion which can be drawn from such insufficient materials is that the forms of these bones do not agree with those of the Ainu or the Japanese, who are the successors, so to speak, of the stone-age people in Yezo and the main islands of Japan respectively.

In general the relics found in the northern districts are comparatively new, showing the latest movement of the stone-age people to have been from the south to the north, that is toward Yezo. Among the Ainu living in the island just named, there are traditions that those who made stone implements and potteries were entirely different from the Ainu themselves or from the Japanese, and that this pre-Ainu race migrated northward as the Ainu increased in number. The Ainu gave several names to the race, Koropokguru being one. Supposing the traditions to be correct, the footprints of the stone-age people must be sought for in Saghalien and the regions situated on the north and the northeast of the northern part of the Kurile islands. According to the Saghalien Ainu, the stone-age people called themselves Tonchi, and lived there about eight generations back. So far as known., the Chukchi, the Aleuts and the Eskimo are those who seem to have had close connections with the stone-age people. Among the three mentioned, the Eskimo are most intimately related to the latter, at least in manners, customs and handiwork. This conclusion is obtained from the minute investigations concerning the stone-age sites and relics.

Present Inhabitants.— In Saghalien there are the Giliaks, the Orokkos and the Ainu. In the Kurile islands and Yezo, the Ainu with some local peculiarities are found. The Bonin islands are inhabited by the naturalized Europeans. The aboriginal tribes and the Chinese immigrants in Formosa are now Japanese subjects. Having these peoples in the northern and the southern parts of the empire, the Japanese proper occupy the chief central islands, and thence spread in both directions. The natives of Loo-Choo have no distinctive ethnological peculiarities, and are to be considered as forming a branch of the Japanese. The Giliaks and the Orokkos are found not only in Japanese, but also in Russian territory, and both of them belong to the Tungus, who are chiefly distributed in the northern part of Asia. The aborigines of Formosa are Malayans, the inhabitants of the Philippine Islands showing a strong resemblance to them. Geographically considered, the large and small islands of Japan form a kind of stepping stone extending from the north to the south. Just as we now find the Tungus and the Malayan at the two ends, so in remote times the chief central islands of Japan might have been inhabited by the northern and the southern races. Moreover, some people might have come from the continent by way of the peninsula of Korea. According to traditions and records, we are led to believe that such was actually the case.

The average height of Japanese men is

about five feet three inches. Cephalic index, 80; hair, straight and black; iris, dark brown; complexion, very light brown, often white in better classes; face, some narrow, some broad; beard, some full, some small.

Among the Japanese proper, there are some who have the Korean physiogonomy, while others show the Malay traits. Some are so hairy that it is difficult to distinguish them from the Ainu. The Japanese language is closely related to the Korean. In Japanese manners and customs some likeness to those of Korea and Malay are found.

It is quite probable that the Ainu, Malay and continental elements are the chief, though not necessarily the only, constituents of the Japanese. See MENTAL CHARACTERISTICS OF THE JAPANESE; THE DEVELOPMENT AND CONSTITUTION OF SOCIETY IN JAPAN.

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3. THE DEVELOPMENT AND CONSTITUTION OF SOCIETY IN JAPAN. Except England, there is perhaps no other country so aristocratic as Japan. From the beginning of its history, there have always been some aristocrats in the land. In the first period after the era of Jimmu Tenno, we find distinction of noble and ignoble classes among the people. Those who had clan names and belonged to some clan were noble, and those who had no clan name and belonged to no clan were ignoble. Before the Reform of Taikwa period A.D. 645–46, society was entirely constituted on clanship and family associations.

Among the nobles, two clans, respectively called Omi and Muraji, stood in the highest rank. Omi was a clan name, mostly conferred on the branches of the imperial line since Jimmu, and Muraji on the clans descended from the branches of the ancestors of Jimmu. Oomi and Omuraji were the names given to the respective chiefs of these noble clans, who were the prime ministers of the emperor or Mikado (Tenno in Japanized Chinese language). Below these clans there were others which performed certain hereditary functions for the emperor. They were called collectively Tomo-no-miyatsuko. Some performed religious function, some military, some judiciary and others weaving, sewing, cooking, forestry, fishery, etc. In fact for every social function a clanship was constituted. They all had their own chiefs. Besides these there were also hereditary clans who had the power of the local administration in the country. They were called Kuni-no-Miyatsuko and Agatanushi. At first the local tribal chiefs, who were subjugated by Jimmu and became loyal to him, were appointed to these local functions, and later the sons of the emperors were also appointed.

The foreign immigrants who were naturalized and distinguished in learning and art were also given a clan name, and left some hereditary function to their descendants.

The smaller family associations were also to be distinguished within these clanships. They had their particular names and organizations and headships. The family names were derived sometimes from their occupation, sometimes from the name of the localities where they dwelt and sometimes from the name of their ancestors. Besides the members proper there were clients or servants who had no clan name and so were servile to the noble class. They were perhaps the aboriginal tribes who inhabited the country before the coming of the superior race, to whom they became serfs and domestic servants.

The early society of Japan was constituted in this way, and it may be called clannish feudalism. For the clan and family chiefs owned the land and governed the people directly. The Mikado had complete power only in his private domains and in those belonging to his family. He had his jurisdiction only in those cases relating to sacrilege, treason and the controversies between several clans and families. In such cases the ordeal of hot water was administered as in mediæval Europe. Otherwise the clan and family chiefs had complete power of life and death over the members belonging to their clans and associations. Hence the clans and families appropriated the land and the people, and had monopoly of offices and hereditary occupations in their respective groups. And by their aggrandisements and encroachments the feuds among them became in time interminable. So came the Reform of Taikwa era, A.D. 645–46.

This reform was the first attempt to put an end to clannish feudalism and to introduce the form of centralized government. In many respects it resembled the Restoration of 1868, only it was based partly on the ideas and institutions introduced from China. By this reform the land and the people were made immediate subjects of the emperor and the state. Before this time they were subject in the first place to their clan and family chiefs, without whose mediation the emperor and the state could do nothing. The reform put an end to the heredity of public functions in certain clans and families. The clan and family organizations were left as before, but the political offices were opened to all without reference to clan or family. The clannish ownership of land was abolished. To indemnify the owners the whole or a part of the taxes paid by a certain number of households was given them. Every male and female above six years old was to be provided with a certain proportion of land. A boy was to receive two tan (4.90 acres) and a girl two-thirds of what a boy received. Not even the servile class was excluded. Those who belonged to the government and were public servants received the same proportion of land as the noble class. But those who were private servants received a third. For this purpose a census was to be taken every sixth year. More-

over, the association of five households living in a neighborhood was organized and put under a headman. A household in those days consisted of several families and several generations, as brothers, uncles and their children lived together with their clients and servants. A household in some cases consisted of more than 100 persons. Women were allowed to become the head of a household. But the distinction between the noble and servile classes was left untouched, although the social intermingling of the two classes was unavoidable. Some poor noblemen sold their clan names and became servile, while natural children were constantly born to the two classes. So it was ordered by the Reform Act that among the noble class the children should belong to the father and among the servile class they should belong to the mother, while natural children of the two should belong to the servile class.

Thus the land and the people were nationalized. The reform, however, was not complete until the laws of the Emperor Mommu were promulgated, A.D. 702. These laws were called Taiho-ryo. By the Reform of Taikwa all people, except military functionaries, were prohibited from bearing swords. Even the royal members and state ministers were not exempted from this rule. By Taiho-ryo the principle of universal military service was introduced, by which every third male was to serve as a soldier. The term of the soldiers in the capital was one year, and that of those in the sea borders three years.

But the above reform and regulations based on it came at a time to be impracticable. For it was the entire reorganization of the central and local administration, as well as of the mode of land-ownership, which the state tried to introduce, while it left the clan and family associations in society as heretofore. The heredity of public functions in certain clans and families was abolished, but the same persons were employed as before in the central and local administration under different names and qualifications. The state was too weak to enforce the intended reforms, while the clanship and family associations were too deeply rooted to be overcome. In time the Fujiwara family or clan descended from Kamatari, who with the Crown Prince Naka-no-oye (afterward the Emperor Tenchi) carried through the reform of Taikwa, got the complete power of government and official functions into their hands. As the salaries of officials in those days, paid by the gifts of cloth and certain amounts of taxes from the land and the people, were not sufficient for ambitious and avaricious men, they appropriated the waste lands, and by cultivation turned them into fertile fields. Thus the private ownership of land and private jurisdiction rearose, and increased more and more. Within these private lands called Shoyen, the central and local governments had no power of administration and the personal and household taxes were free, while the taxes on land were very light. So the increase of these lands subtracted in fact so much from the power of the emperor and the state that the court tried to put an end to this private system of ownership and jurisdiction. But being unable to prohibit it, the court finally succumbed to it; that is, the court sanctioned it, and had its own private domain and jurisdiction.

As the central government was too feeble, and the system of universal military service and drill was not carried out, there arose a powerful class of men in the country who were at first the administrators of Shoyen or the court nobles' private lands, ruled the peasants below them, and sent soldiers to the capital as guards and police. They were the middle class and backbone of society throughout the whole country. They were afterward called Bushi or Samurai. (See article — THE SAMURAI). In the meantime the old clanship and family associations were entirely confused, but the new clanship and associations arose in their place. Such was the Fujiwara Clan, and after it came Tachibana, Taira and Minamoto clans in succession. They were the nobles of the capital, branched out from the imperial family, whose descendants and relations were ramified throughout the country. As the government was too weak to protect the life and property of the people, the noble clans attached to themselves the people, and especially the fighting men became their retainers. In the capital (Kioto) the Fujiwara Clan held the perfect control of government for several centuries. But they were mostly civilians and had need of generals who could fight. Now the two clans of Taira and Minamoto, which title was bestowed by the emperor, respectively descended from the younger sons of the Emperors Kwammu (A.D. 782–806) and Seiwa (A.D. 859–77), became very powerful as military leaders. They were not able to compete with the Fujiwara Clan in civil administration and at the court, and so they served as generals and as local governors, where there was much disturbance. They grew up to be two great rival clans in the capital and throughout the country. The fighting men, or Bushi, became their retainers. Thus the new feudalism, based on land and local associations and attached to the military clans of Taira or Minamoto, was gradually formed in spite of the prohibitions and remonstrances from the central government. Finally the emperor, the Fujiwara Clan and their several families were powerless against the two military clans, who had successively fought with each other for the supremacy in the capital and in the country. The Minamoto Clan vanquished the Taira Clan under the leadership of the two brothers, Yoritomo and Yoshitsune. Yoritomo (A.D. 1186–1200) was the founder of military government and organizer of territorial feudalism, which continued down to the Restoration of 1868. Yoritomo was the first Shogun (general in chief) in the special sense of that term. He established military court called Bakufu at Kamakura, which was the second capital and the centre of military government for 146 years (A.D. 1186–1332). Yoritomo, by the sanction of the emperor, established the military chiefs in every province side by side with the civil governors appointed by the court. Thus peace and order were preserved, after civil wars had distracted the whole country. The code of honor and allegiance to some military chiefs besides the emperor, now called Bushido, arose in this period. The virtues of courage, loyalty, magnanimity, simplicity and frugality

were inculcated by Yoritomo and his contemporaries. From this period also those who had large private estates and many retainers were called Daimyo (greater barons), and those who had smaller estates Shomyo (lesser barons).

After the Ashikaga family, a scion of the Minamoto Clan, succeeded in the military government of the country, A.D. 1336, and established Bakufu at Kioto, the dual system of local administration was done away, and only the military governors appointed by the Shoguns were left in the provinces. The office of these local governors became hereditary functions, the ownership of land and political jurisdiction were now identified, and thus the feudal system was made complete. The local chiefs who were the administrators of nobles' lands in the previous era became independent local magnates. At first the retainers of military chiefs tilled the soil in the time of peace, and were soldiers only in the time of war. But during the Ashikaga period (A.D. 1338–1573) wars were so constant and general that fighting was the only occupation of the retainers. Thus the military class and the industrial class became entirely distinct, although there was of course constant recruiting from, and mixing with, each other.

Under Tokugawa Iyeyasu, also a scion of the Minamoto Clan and the victor of the famous battle of Sekigahara (A.D. 1600), the most perfect form of feudalism was established and continued down to the present era. Bakufu was established at Yedo, now Tokio, which very soon became the largest city in Japan. During this Tokugawa period, the emperor was powerless, more so than during the Kamakura and Ashikaga periods, but was none the less held divine as before. Iyeyasu and his descendants were able to hold the whole country in peace, almost without intermission during the two centuries and a half. The function of the Shogun was hereditary, but it needed the imperial investiture every time. The whole country was distributed to the military chiefs or nobles, most of whom arose during the civil wars at the end of the Ashikaga dynasty. These territorial nobles had complete power of government within their provinces, and no appeal to the central government was allowed against their decisions in civil and criminal cases. But they were responsible to Bakufu for misgovernment. Their succession and marriage required the sanction of Yedo government. So long as they governed their provinces well they were allowed to hold their fiefs and to transmit them to their descendants. Bakufu only regulated the military, monetary and postal and foreign affairs.

During the Kamakura and Ashikaga periods one knight and several foot soldiers were perhaps furnished from every unit of feudal tenure. In the latter period the land tax was paid in money in some localities, but Hideyoshi enforced the ancient custom of payment in rice, which was followed by Iyeyasu and continued till 1873. According to the regulation of the Kwanyei period (1624–43), the Tokugawa government demanded from all land producing 1,000 koku of rice (a koku is equal to 4.9629 bushels), 23 soldiers, 2 spears, 1 bow, 1 musket; from all land producing 10,000 koku of rice, 235 foot soldiers, 10 knights, 10 bows, 20 muskets, 30 spears; from all land producing 100,000 koku of rice, 2,055 foot soldiers, 170 knights, 60 bows, 350 muskets, 150 spears, and so on in the same proportion. During the Genroku period (1688–1703), it is said that the whole country, with the exception of the island Tsushima, produced 25,786,895 koku of rice. Now the Tokugawa government owned, as its immediate feudal tenure, the land which produced 8,000,000 koku of rice. It was more than one-third of the produce of the whole country. The greatest territorial noble had only 1,000,000 koku of rice for his income. So the Yedo government, under the Shoguns and their immediate soldiers, was the most powerful feudatory in the country, and by the aid of the other branches of the Tokugawa family and former retainers now settled as territorial nobles in various provinces, was able to keep the most insubordinate feudal nobles in peace. The territorial nobles who had the income of 10,000 koku of rice and upward were entitled to be called Daimyo. These Daimyo or territorial nobles were obliged to leave as hostages their wives and children at Yedo. They had to attend the court at Yedo every year at first and later every other year. They had to aid Bakufu in cases of great occasions and expensive public works and had of course to furnish contingents when the general or special levy was ordered. Military levy was also made on the military class who had the income of less than 10,000 koku of rice.

The land of Daimyos who had no sons to succeed them was escheated at first, but later the Daimyos were allowed to name their successors. The military class, including the Daimyos and their retainers, all came under the jurisdiction of Bakufu. Bushi or Samurai were nearly all of them retainers of some Daimyos. They were obliged to bear two swords, one long and one short. They all had family names besides their personal names. They were carefully educated in the art of fighting, and also in the Chinese classics. They were thus taught Bushido and Confucian ethics. They were the fighting class, but from them all the civil officers were supplied. They were free from taxation, and were exempted from criminal law. The code of honor was their supreme law. In case they committed great wrong, they were permitted to punish themselves by means of Harakiri, or honorable suicide. But if they committed heinous crimes unworthy of Samurai, they were first deprived of their Samurai rank or gentility, and then they were punished as any other criminal belonging to Heimin class (common people).

Besides these retainers there were free Samurai who had no lord to serve. They were called Ronin (floating men). They were originally retainers of some Daimyos, but they lost or for some reason left their lord, and so became lordless Samurai. They were permitted to have family names and bear two swords like all the rest of the military class. They were very independent and a source of great trouble to the government. But the principle of Bushido was sometimes best exemplified by these men, as is well known by the story of the 47 Ronins.

The physicians, priests and scholars did not belong to any feudal classification. They did not belong to Samurai. So they were legally

Heimin (common people), but they were not so treated. They were honored and respected. The physicians and scholars were entitled to have family names and bear swords (physicians only one). They at first shaved their heads just as the Buddhist priests do even now. This was for the reason that during the Ashikaga period the civil wars were so general and learning declined so much that the priests alone were the learned class as in the dark ages of mediæval Europe. During the regency of Shogun Tsunayoshi, A.D. 1681–1709, scholars ceased to shave their heads, but the physicians commonly did shave their heads till the present era.

The Buddhist priests were the great instrument in the spiritual and material civilization of Japan. As militarism prevailed in the country, they alone had the key of knowledge and education. Some of them were teachers and counsellors to the emperors, shoguns and local magnates. They were universally recognized as such by the common people. During the Tokugawa period the special class of scholars arose, and the government undertook the education of the military class. But the education of the common people was left still to priests and private persons. Hence all private schools devoted to the education of the common people were called Terakoya or church-schools. To send children to the church meant to send them to school. As scholars arose the privilege of educating the children was not monopolized by the priests as in the previous periods, but their influence was enhanced in another direction. Since Christianity, that is (Roman Catholicism), was entirely prohibited (A.D. 1636), every Japanese was obliged to belong to some Buddhistic church. Thus the priests had the power of census in their hands. All births, deaths and marriages were registered by the priests, and their certificates were necessary. Every Buddhist church had its constituents among the people, who supported the priests and the temples belonging to them. The priestly functions were open to all classes, if they wished to enter them. In the age of militarism and hereditary nobility, priesthoods alone were free to all. Those, therefore, who were tired of worldly ambition, fond of learning and were offended at the feudal caste-system, entered the priesthood.

The art of healing was highly respected in Japan, and physicians were employed as court doctors both in the central and local governments. In fact it was the art of healing which saved Japan from Oriental stagnation and decay. It was in the year 1771 A.D. that a few able physicians in Yedo began the study of the Dutch language and medicine, which finally opened the eyes of the intellectual class to Western science and civilization. "Be a prime minister or become a physician, for they are both benevolent arts," was a common saying in China, and it continues to be so in Japan until this day, though the maxim itself was forgotten long ago in China.

Heimin or the common people consisted of two classes. Those who lived in villages were called Hiyakusho. They were peasants. Those who lived in the towns were called Chonin. They were merchants, traders and artisans. They were not allowed to have family names or bear swords. Merchants and traders had their shop-name, and used it before their personal names. Otherwise they named their particular trade. So did also peasants. They called themselves Hiyakusho so and so. But by exceptional merit they were sometimes entitled to have family names and bear swords, which was considered a great honor. At first the Heimin were allowed to bear swords, but as it proved dangerous long swords were prohibited to them, A.D. 1644, and finally all swords were prohibited, A.D. 1668.

The town people, or Chonin, were put under the jurisdiction of a machi-bugyo or governor, but they were largely left to their own self-government. The Elders, called Machi-Toshiyori, were selected and appointed from them (there were three in Yedo). Below them there were Nanushi, or headmen, for one or more streets (268 in Yedo). Under these there were Jinushi or land-proprietors, and Yanushi or house-owners, who performed various important functions for their wards. There were also Goningumi (five-men-association), consisting of five neighboring households organized for mutual help.

It was the same with regard to the administration of the villages. In each village there was a headman called sometimes Nanushi, but usually Shoya. He was elected by the peasants themselves from one of the most honorable families among them. His term of office was sometimes for life and sometimes for a number of years. There were also the Goningumi and its headman; deputies of peasants who participated in the administration of the villages, and sometimes there were Ojoya or great headmen who were superintendents over the headmen or shoyas of several villages, sometimes 10, 20 or more villages.

Below the Heimin class there were outcasts and beggars, respectively called Yeta and Hinin. The Yeta class were butchers, and they were specially despised, as Buddhism taught men not to kill animals. These people were allowed to live only in certain districts and quarters, and there were some villages called Yeta-mura, where the Yeta class only dwelt.

In Yedo these classes were put under the jurisdiction of special men, selected from their number, to govern them. In case a Heimin became a beggar, he could retrieve his position by industry. But if he married a beggar woman and begot children, he could return to his former class, but she and her children could not rise with him into the Heimin class.

Three years after the Restoration (1871), all classes were allowed to intermarry with each other. And in the same year the names Yeta and Hinin were abolished, and the outcasts and beggars were also incorporated within the Heimin or common people.

A kind of slavery existed from a very early period. That is, poor people sold themselves to the rich and noble. During the Kamakura period there came to be a special sort of tradesmen called Hito-akibito, engaged in buying and selling servants. The government prohibited this kind of trade, but could not stop it. In the Ashikaga period they kidnapped young boys and girls and sold them. This continued down to the Tokugawa period, when it was made a capital offense. The government at one time even tried to limit the term of engagements of

the servants to 10 years. In fact, in 1872 long engagements were prohibited as slavish, and restricted to one year.

The morality of sexes has always been the weakest part of Oriental ethics in general. It was so in Japan. Divorce was easy, and concubines and mistresses were permitted to the noble and the wealthy. But in spite of all irregularities and licentious practices in fact, monogamy has always been a legal marriage. That is, bigamy or polygamy in a literal sense was not recognized by the law. Only one woman was a man's proper wife. So there has been only one queen, properly so called. That was a rule, though there were some exceptions in some corrupt periods of Japanese history. In primitive Japan a marriage was allowed between brothers and sisters of different mothers. It was a universal custom that a woman should not go over to her husband's house after her marriage. She remained at her own home, which the husband frequented as a visitor. On the marriage day, a bridegroom went to the bride's house, where there was a feast prepared. Even to this day, in the marriage ceremony a nuptial cup is first given to the bride, and after she drinks it is given to the bridegroom. It means that she is the host and the bridegroom is the guest. It continued to be a custom for a long period of time, that the wife should remain at her parental home for several months or even several years after her marriage before she was taken over to her husband's house.

After the Kamakura period it came to be a custom that the wife should be taken to her husband's home immediately after the day of marriage, which took place at her house. Later, the bride was taken to the bridegroom's home from the first, and the marriage ceremony itself was performed at his house. However, even during the Tokugawa period and in fact till to-day, a woman always keeps her own family name, which is used as her honorary title and shows her good breeding.

During the Kamakura period a wife was able to have her dowry as her own property, which was not allowed to be mixed up with that of her husband. Even when her husband's property was confiscated her property was not touched, except in case of heinous crimes such as treason, murder and robbery. If she was divorced and a child was born after her divorce, a boy went to the father and a daughter to the mother, but until 10 years old the boy was allowed to remain with his mother. It was the original custom in Japan that property should be divided among all children and even to the relatives. It was so in the Kamakura period. In case the owner did not execute his will before his death, the government did it according to its discretion. If there was no child or relative left to succeed to his property, it was given over to the temples and the churches.

During the same period land was sold freely, but the military class was prohibited to sell the beneficiary land given by the government as a reward. Later even hereditary land was not allowed to be sold to the lower class. During the Ashikaga period, primogeniture in the male line became more and more the rule for the succession of estates. And it was made the strict law during the Tokugawa dynasty. Division of estates was not permitted, and the eldest son inherited the whole property of his father, while it was made his obligation to support all his brothers and sisters. As the younger sons could not inherit any property from their father, they had to be adopted by a childless Samurai before they were permitted to marry, and unless they were very distinguished in talent and ability they were not allowed to start a new family.

The Tokugawa government prohibited a peasant to change his occupation and to become a tradesman. He was not permitted to sell his soil and divide it among his children in case it was not more than one cho (2.45 acres) in extent. In fact, all sale of land for perpetuity was not allowed except in the cities of Yedo, Kioto and Osaka. Even its transference was restricted by law, in order to prevent the accumulation of estates in the hands of a few large proprietors. Throughout the whole history of Japan the legal principle relating to land was that the proprietary right belonged only to the state. In the year of the Restoration, 1868, the land belonging to the villages was turned over to the peasants, and the sale of land for perpetuity was legally allowed in 1872.

From very early times there was a ceremony called Gembuku, observed when children grew up to be mature. It was so called because the dress of an adult was to be worn from that time. It was called Ui kamuri (new cap), because a man's cap was given for the first time. The age was not fixed by law, but usually at 15 or 16. In the case of emperors and rulers, the ceremony was performed even in childhood. It was performed sometimes at night and sometimes in day time, and it was considered a matter of great importance, especially by the military class. A master was needed for its performance. He was either a chief-man of the clan or family, or the suzerain to whom he owed his allegiance. He was called Eboshi oya or sponsor (Kamuri is a general term for cap, and Eboshi is a special term for a kind of cap formerly worn by the Japanese nobles). During the Tokugawa dynasty, a cap was omitted except in the case of court and territorial nobles. The retainers only changed the manner of hair dressing at this ceremony. Now this custom is obsolete.

Society in Japan, as it has historically developed and as it now stands, is legally distinguished into four classes: (1) Kwozoku or the Imperial family; (2) Kwazoku or the Nobility; (3) Shizoku or the old Samurai or Bushi; (4) Heimin or the Common People.

1. Kwozoku.— The imperial family in Japan is the oldest existing royal family in the world. The mikado or emperor is the earliest institution, and stands at the basis of all other institutions in the country. The present emperor is the 123d of the imperial line. No king or emperor or president has such unanimous reverence and love of his subjects. The people are very proud of the fact that the reigning imperial family has descended from time immemorial in an unbroken line of succession to the present. Indeed, the imperial family is now the emblem and embodiment of national immortality. It signifies the fact that Japan has never been conquered by the out-

side nations. It means that the imperial house and the people are one and inseparable elements of the state. It signifies also that in spite of great social and political revolutions which the people have undergone in the past there is something steady and consistent in the national character. Since the 8th century A.D. the imperial family has reigned but has not governed. The noble families one after another took possession of the governmental power. Still they all governed in the name of the emperor, or some member of the imperial family. Throughout the whole history of Japan the emperor has been the fountain of honor and the bestower of the official degree of rank and title on all functionaries, including the Shoguns and the Daimyos. Before the present constitution was promulgated (1889), the female succession to the throne was constitutional, and Japan has had six empresses among the sovereigns of the past. Hereafter the throne shall be succeeded to only by male descendants in the male line.

2. Kwazoku.— This is the title of the nobility in Japan, legally adopted in 1869 when the old appellations of court and territorial nobles were abolished. However, the existing orders of nobility were created only in 1884, and the nobles were classified into five orders of princes, marquises, counts, viscounts and barons. Among them are three classes distinguished. First comes the old court nobility called Kugĕ. They are the oldest families of all the nobles, some of them being more than 1,000 years in existence. Before the Restoration they were all very poor and abject in condition. On account of the feudal system which prevailed they had no work but to attend the emperor and discuss the matter of bestowing honorary degrees of rank and title. Next come the old Daimyos or territorial nobles, who were the former local hereditary rulers. Some families among them are seven or eight hundred years, and some about 300 years old. They voluntarily gave up their lands and people to the emperor in 1869, when they were made the local governors instead of Daimyos. But the system of local autonomy was entirely abolished in 1871, when they were forever removed from their provinces and removed to Tokio. Last but not least are the new nobles created since 1884. Prominent among them are the statesmen and generals who broke up the Shogunate and the feudal system, established Parliament and the constitutional government and brought to the successful issue the wars with China and Russia.

3. Shizoku.— This is the title legalized also in 1869, to be applied to the retainers of the Daimyos. At first the lowest class of retainers were called Sotsu, but this distinction was abolished in 1872. They had been a privileged class, with hereditary pensions. The leaders among them were the chief movers in the abolition of the Shogunate and the Restoration of the emperor to power. With the downfall of feudalism and the decree of universal military service issued in 1873, they lost their hereditary military function, and in the same year another decree was promulgated announcing that the government was ready to commute the pensions of the Shizoku at the rate of six years' purchase for hereditary pensions and four years' for life pensions — one-half of the commutations to be paid in cash and one-half in bonds bearing interest at the rate of 8 per cent. Many of them voluntarily gave up their pensions for this meagre commutation, determined to earn their living hereafter by industry and trade. But there were also many who could not adapt themselves to this new condition, and so they were for some years the constant source of local disturbances and insurrections against the new government. But the vast majority of them entered the civil and military service in the new government, and also engaged in the work of education. The universal military service and universal common education, based on the western system, led by these men as captains and teachers, was wonderfully successful, as is shown by recent results.

4. Heimin.— To this class belong mostly the common people engaged in trades and commerce, field tillage and all kinds of manual labor. The distinctions between the Shizoku and the Heimin are only nominal and fast disappearing, for many of the former Samurai are now engaged in tilling the soil and in every kind of industry and trade, while those belonging to the former Hiyakusho and Chonin are legally equal to Shizoku in all respects. Universal military service and universal education are making them all equal or nearly equal in spirit and character. The Heimin fought as common soldiers against the Samurai class when they rose against the new government; they finally put down the Satsuma Rebellion in 1876, and in the wars with China and Russia, their courage, valor and devotion were signally displayed.

Even before the Restoration, the Heimin class had imbibed the chivalric elements of the military class in their theatres and Yose (houses where public entertainments were given), and now that education is made universal and the constitution has secured to them equal rights and privileges, it is no wonder that they are fast rising into power.

According to recent statistics, the population was divided among the various classes as follows: Imperial family, 69; Kwazoku, 5,937; Shizoku, 2,310,269; Heimin, 51,045,983. The rate of increase among Kwazoku is 10.47 per thousand; among Shizoku, 8.26; and among Heimin, 15.54. The nobility was strengthened by the creation of new members. The Shizoku, notwithstanding their disorganization and poverty, were able to increase greatly in population, and their assimilation with the common class has been the most powerful means in raising the spirit and character of the whole nation.

Though the division into noble and servile classes has always existed in Japan, it was not a caste system in fact. Though a legal marriage between them did not take place as a rule, concubinage constantly infused democratic blood into the families of the higher class. When a wife was childless the sons of concubines became heirs, and as the noble women were not so fertile as women of the lower class, the blood of aristocracy in Japan has become very democratic notwithstanding high pedigrees and pretensions. Moreover, as local and general wars were so frequent until the beginning of the 17th century, the ruined aristocratic fam-

ilies and their retainers were constantly forced into the lower class, so that there was a perpetual influx of aristocratic blood into the veins of the common people. This explains why, under certain circumstances, the Japanese aristocrats are very progressive and even democratic, and why the common people themselves are so aristocratic and love aristocracy as the natural form of social institutions.

Two things distinguish society in Japan from that of Europe and America. In the first place, family, and not the individual, is still the living social unit. Ancestor worship is still a living religion in every family. The freedom of faith is recognized by the Constitution and there is no particular ecclesiastical organization sanctioned and favored by the state. So the people are Buddhists, Shintoists, Confucianists and Christians, according to their individual tastes. But it may be said that ancestor worship is still common to all classes. In each family there is a legally recognized head, who has the reins of domestic government. Moreover, a council held by relatives is authorized and recognized by the law. The continuity of the family name and its succession is regarded as so important, that the adoption of sons and daughters is still practised by those who have no children.

In the second place, the state is all in all in Japan. The idea of the state is exactly that of the ancient Greeks and Romans. The state is a whole and the individual a part. The state has existed so long and developed so strong that no one thinks of rights not bestowed and recognized by the state. In Europe the Church existed before the state, and the strong and mighty influence it has still is known to all. In Japan there is no conflict between the state and the church. The state existed before the introduction of Confucianism, Buddhism and Christianity, so that there has never been and can never be any religious association claiming rights above the state, as in mediæval Europe. So the state and the church are completely separate. The state holds in its hand the entire control of education, marriage and the civil status of every individual. Japan is wholly free from religious embarrassments in these respects. After half a century of great political and social transformations, all classes are in unison and equally progressive and conservative. There are some radicalists in politics and thought, but no anarchist. There are many conservatives, but no reactionary. The organizations and strikes of laborers have already begun, together with the introduction of the modern factory system and its defects. But the Socialists as a party have as yet no existence in Japan. Herein lies the strength and weakness of Japanese society. Though strong and united as no other nation is, individually and socially speaking, Japan is still a youth and mediocre.

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4. MENTAL CHARACTERISTICS OF THE JAPANESE. There are few subjects where anything approaching scientific exactness is more difficult, or even impossible, than those which fall under the general title of «Race Psychology.» The very facts which might serve as the basis for a trustworthy conclusion are exceedingly abstruse and complex; they are indeed of such a character as to require for their detection and appreciation a trained and experienced observer. But supposing the facts to be admitted, there are then no well-established principles under the guidance of which the facts may receive a satisfactory theoretical treatment. For there is no universal agreement as to the existence of definite race temperaments; while, with those observers who accept the theory of specific mental characteristics for different tribes and nations, the practical application of their theory to particular cases is not accustomed to produce very notable results. Nevertheless, we are believers in the existence and predominating influence of temperament considered as manifesting itself in large collections of individuals who share the same admixture of blood, through long periods of time.

In applying this belief to any particular people, however, one or two important considerations can never be safely lost out of mind. The first and most important of these is the spiritual unity of all the different races in one human race. This fact of an essential spiritual unity, as enunciated and illustrated by anthropologists like Waitz and others, may be accepted as a fundamental factor in the solution of all the psychological problems belonging to this class. As far back as we can go in history, and as far afield from the centres of race-culture to the extreme borders of barbarism and savagism, human nature appears to be essentially the same. Even that mythical being called «primitive man» is not exempt from this conclusion. And so long as we remain upon sound empirical grounds it must be admitted that a far wider gap exists between the lowest of the human species and the highest of the lower animals, than between the lowest and the highest of the *genus homo*, or the highest of this genus and its own most successful efforts to picture the nature of the angelic and the divine. In every large collection of individuals, moreover, while a certain average quality may be detected as belonging to the great majority, many important differences must be observed. Thus all the different temperaments appear, in a more or less distinctly marked form, even among those peoples which are as a whole most definitely characterized by a so-called race temperament. And, finally, as the physical and social environment of any people, however exclusively its temperamental mixture may have remained, undergoes either slow or more rapid but important changes, the mental characteristics of the race seem to become altered or obscured.

In attempting, then, to describe the mental characteristics of the Japanese it is assumed that they are in all essential respects *like ourselves* — whether by «ourselves» be meant Americans, English, German, French, or, as well, the more important races of both the Near and the Far East. This consideration, however, serves rather to emphasize the further truth that a certain characteristic mixture of mental and moral qualities may be observed, which is quite worthy to be called the «Japanese temperament.» Here human nature has attained a highly specialized type. In a word, there is probably no other one of the foremost and equally populous nations of the world whose mental characteristics, as de-

veloped on a basis of race temperament, are more strongly marked. And the reasons for this are not difficult to discover.

So far as the obscure problem of the race origins of the Japanese can be solved by modern ethnographic authority, the most probable conclusion may be stated in the following way. The modern Japanese race originated as a mixture of Tartar or Mongolian (in the larger and somewhat looser, but not altogether inappropriate use of the latter term) and Malay immigrants with the Ainus and traces of other indigenous elements. It is a not improbable conjecture that the varied and conflicting character of the elements which thus became combined accounts for some of the more puzzling features of that national temperament which has resulted from this mixture of races. Interesting differences characterize the Mongolian and Malay peoples; and both of these differ in important ways from what we know of the Ainus and other less-known tribes indigenous to Japan. As supremely important molding influences to determine the mental characteristics of the Japanese of to-day, three historical facts demand our attention. However different, or even conflicting, the original elements may have been, they were welded into a common typical form by a long period of comparative isolation and exclusion of other admixture with foreign elements. Through generations, and even through centuries (for the educational and artistic influences from China and Korea did not modify the result in an important way, so far as this temperament was concerned), the process of specializing by combining and recombining the same elements went on without interruption from outside sources.

The second historical fact is recent. After centuries of physical and social isolation, such as is favorable to the production of a specific type, there has followed a half-century of rapid changes due to altered relations toward foreign influences. These recent changes have, however, as yet resulted in very little admixture of foreign blood. They have, therefore, produced no essential alteration in the temperament or the hereditary mental characteristics of the Japanese as a people. But they have, of course, produced important alterations in the physical and social manifestations of these characteristics. On the one hand, they have had the effect to confuse, for the time being, the minds, the morals, the ancestral ideas and customs of the people; and to make upon the superficial observer a variety of bewildering and contradictory impressions. On the other hand, this period of rapid change is defining, deepening and developing the Japanese temperament, and of course, also, the essential mental and moral characteristics which rest upon it as on their base.

The third important historical fact is the development of the feudal system. This resulted in making the economic and social condition of Japan down to its modern era much more like that of mediæval Europe than of China. Indeed, we are almost justified in denying that Japan has ever been an *Oriental* nation in the fullest meaning of the words.

When we come to inquire, therefore, as to what term shall be employed to designate the temperament of the Japanese, the answer may be given with a rather unusual degree of confidence. For the ethnographic conditions and the historical influences have combined to give the nation a distinct quality. This temperament is predominatingly sentimental, although with considerable infusion of the choleric. The sentimental temperament is characterized by great sensitiveness to all kinds of impressions, especially those of a sensuous and æsthetical order; by varied, strong and oftentimes sudden and even conflicting and tumultuous reactions; by an eager but somewhat naïve intellectual curiosity and a versatile gift of adaptability; by a lively, picturesque and concrete, but usually not profound or scientifically controlled imagination; by warm, responsive, but rather unstable emotions; by a splendid power to attain, under trying emergencies, the heights of moral and religious devotion and achievement, and yet a tendency to carry to extremes certain particulars and thus to miss somewhat of the controlling principle of an ethical harmony; and by a disposition to deal with moral and religious truths as though they are matters worthy of only a passing curiosity rather than concerned with the profounder insights and most important activities of human life.

If now we adopt this description as in the main characterizing the racial temperament of the Japanese people at large, we must at once remind ourselves of certain important modifying considerations. As among every gifted and highly developed people, so in Japan, there are many examples of other temperaments or temperamental mixtures. And indeed, no so-called "race temperament" can remain *pure*. That intense and persistent energy, combined with intellectual sagacity and the power to organize and to achieve practical results by following up one's purposes with a consistent and unswerving determination, which is characteristic of the choleric temperament, has been well marked in the case of many of the great men of Japan. When instructed and disciplined, as it was under the old régime among the Samurai, it produced many splendid examples of a noteworthy and admirable but one-sided chivalry. It produced a system of nicely adjusted customs and manners, where appropriateness and a subtly adapted symbolism ruled over the conduct of classes and gave an air of good breeding to all. And nowhere else, in the world's history, have there been more notable examples of supreme, self-sacrificing devotion to persons and to a chosen cause.

On the other hand, it must be admitted that a certain instability, or lack of steadiness, often amounting to fickleness, and a tendency to reverse movement, to change opinions, parties and sides, even to entertain contradictory plans and purposes, characterize the sentimental temperament. In this way must we account for the extremely puzzling nature, to the man of a different race temperament and of Occidental culture, of many of the mental characteristics and of much of the conduct of the Japanese people as a whole. It is peculiarly difficult to know the Japanese at all thoroughly, and to maintain toward them an attitude of indifference.

With regard to the fundamental appetites and passions of human nature, no well-defined difference appears between the Japanese and the inhabitants of the different highly civilized parts

of Europe and America. Centuries of an almost complete disuse of animal food, combined with the climatic influences of those regions of Japan that are the most populous, may have had some important effect in bringing about an absence of the manifestation of physical vigor and of that energetic and direct way of going about the business in hand which characterizes the Anglo-Saxon and Teutonic races. The philosophy of life which was introduced by Buddhism, and which has, together with Confucian ethics, influenced the upper classes and filtered down through the lower orders of the people, has also been of great importance. In such matters, in Japan, as everywhere else, economic considerations are also very powerful. Whatever the causes may have been, the Japanese have never been, and are not now, so much given to gluttony and to intemperance as the people of nothern Europe.

In the past, and even down to the present time, the sexual relations of the Japanese have been characterized by a certain greater degree of looseness and lack of moral and social restraint than has been the case among the people of Europe and of North America. This has not been due, however, to any excess of sexual appetite or to deficiency in moral feeling or lack of a moral code. It has chiefly been due to the social constitution of the people, and to the fact that the prevailing ethical and religious opinions and principals did not emphasize the sexual relation as being, primarily considered, a matter of ethical concernment. We have, therefore, on the one hand a certain naïve openness of speech and of conduct in these matters, such as astonishes and shocks the reader of the Kojiki and of much of the older and more modern literature, as well as the observer of customs which have prevailed well down into the modern era. Such are phallic worship in religion, concubinage, licensed prostitution, promiscuous bathing and free exposure of the person, as well as a relatively low estimate put upon the value of sexual purity as a personal virtue, when considered apart from the sentiment of loyalty. On the other hand, there is in Japan a relative absence of the more coarse and brutal forms of sensuality; and on the part of woman a traditional willingnèss for self-sacrifice which it is difficult even to explain, and much less to justify, to the Occidental mind, but which frequently springs from the very noblest sentiments of devotion and loyalty. The changes for the better, both in opinion and in practice, which are taking place in the country, make it perfectly clear that inferiority, whether from the point of view of intellect or morality, cannot be charged against the Japanese in this regard. It is also worthy of mention that the more serious moral and religious didactic literature of the Japanese, as represented in dramatic form by the "No," is almost absolutely free from any impure suggestions.

As to the other emotions and sentiments, the life of feeling among the Japanese corresponds in general to the type already described. Anger, jealousy, envy, grief, sympathy and the domestic and friendly emotions are quick to kindle, and tend to run to excess or to change to their opposites when they have either become themselves exhausted or have seized upon any observed or imagined reason for change. But the artistic feeling which produces a fine sense of propriety and a regard for personal dignity, reinforced by that carefully defined and legally guarded system of rules of behavior (especially under the Tokugawa dynasty), to which reference has already been made, serve to modify and repress the manifestation of these feelings. Even smiles and laughter come often to be the mask of grief and sadness rather than the expression of happiness and rejoicing. Hate and love, jealousy and sympathy, strong dislike and strong liking, hide behind an unmoved or courteous demeanor and finally break forth to the surprise of the foreigner who is self-deceived, rather than deliberately deceived by others, through a lack either of insight or of sympathy. Thus the subtle, complicated and indirect, rather than the open, simple and frank character of the mental life becomes still further emphasized in the conduct of the Japanese. Here again, however, under the prevailing sense of honor and the ruling principle of loyalty, as the one belongs both to the temperament and to the historical development of the people, and as the other is the gift of the Confucian ethics emphasized and deepened by the same historical development, the very highest examples of a knightly and trustworthy manhood have been commendably frequent in Japan.

More particular examination of the intellectual traits of the Japanese calls for something like the following analysis. These traits are such, however, as on the whole go with, or rather are an integral part of the sentimental temperament in its higher and finer forms of culture. And, first, we may note an exceedingly vivid, enterprising, and, so to say, hopeful intellectual interest and a widely varied intellectual curiosity. The average Japanese has an inquiring mind. This often manifests itself as a naïve and almost childish desire to know how natural objects are constituted and how manufactured articles are made. It is back of the quiet, open-eyed wonder with which the children stare at the manners and dress of the foreigner (marked by an almost complete absence of any tendency to rudeness or violence); and it shows itself in that semi-religious feeling of mystery with which the displays of freakishness, as well as of power, by nature are regarded. What has been called the "hopeful" character of this varied intellectual interest leads to the ready confidence that whatever anyone else has made may as well, or even better, be made by the Japanese; and it is perhaps also influential in producing the so frequent conviction that even the fundamental mysteries of existence and of human life are not beyond the possibility of a new and much improved solution by some adventuresome young Japanese philosopher who may add the training of modern science to his own extraordinary native ability.

This native curiosity is undoubtedly productive of an unusual versatility of intellectual operations and achievements. The Japanese mind is decidedly gifted in adapting itself to changed conditions and adapting means to ends. This is the truth which underlies the charge so often made in recent times that the Japanese are "merely imitative" and not "original" or independently inventive. It is scarcely necessary to remark in this connection that the claim to be *original*, in any very strict meaning of that word,

cannot be fairly made by any individual or any nation. And, on the other hand, no people have produced a type of race-culture more strongly marked by distinct characteristics, or signalized by individual members of stronger character, than have the Japanese. It is the versatility and adaptability of the intellect of the race, rather than the merely imitative quality of their achievement, which is noteworthy. The notion, therefore, that Japan owes its recent remarkably rapid progress entirely to its opportunity to borrow what other people had worked out for themselves in an original way, is quite indefensible in the face of historic truth. The whole history of Japan has been marked essentially by the same characteristics. Through all this history, foreign languages and literatures, manufactures and arts, arms and ships and modes of warfare, have been adopted, adapted and improved upon to meet the peculiar requirements and necessities of the national development.

These qualities of intellect result in rather unusual gifts of making a "synthetic seizure," or picturesque mental presentation of the concrete object, or of some form of statement in which the general principle is embodied or applied. Such is apt to be the character of the work done by the form of imagination that suits best the other characteristics of the sentimental temperament. The Japanese language has remained, almost down to the present time, in the synthetic stage. It has an enormous variety of verbs and verbal expressions for the various modifications of activity such as are expressed in English by the words, "to put," "to go," "to do," etc., when followed by different prepositions (a form of speech of which the Japanese language makes comparatively little use, since it has relatively few post-positions). The general form of action has never been analyzed out of its varied forms of application; but each one of these forms has been seized by the mind as a totality and apprehended in this its natural synthesis, so to say. Hence, on the other hand, there is a wonderful power of suggestiveness in single words or phrases; as, for example, when all the longing, love and sweet sadness of parting from friends is compressed into the word *nagori-oshu*, or when one returns thanks for an invitation to dinner of the day before, by simply saying *sakujitsu* ("yesterday"). This concrete and picturesque character of the working of the imagination is both illustrated and intensified by the many periphrases which the recognition of class distinctions and of specialized forms of personal relation has tended both to produce and to enforce. Thus the impression of subtlety, complexity and indirectness of mental characteristics is renewed and magnified.

It cannot be denied that the excellencies of the intellectual activities which characterize the Japanese have their correlated deficiencies. And these deficiencies are, in the main, just those which customarily belong to the sentimental temperament. Patient, prolonged and carefully guarded observation of fact, with the judgment held in suspense until it can be tested by a sufficient accumulation of cases or by the well-known methods of scientific induction based upon experiment, is neither natural nor easy for this temperament. Truths are discovered or proved, not so much by any strict adherence to logical processes as by a kind of mental seizure which depends upon the working of a lively and picturesque imagination suggesting to the curious intellect an answer to its problem. It still remains doubtful, then, whether the higher forms of mathematics, logic, physics, chemistry and even the psychological sciences will receive an accession to their accumulated store of clearly ascertained and defensible principles, corresponding to the amount expended upon education by the New Japan. Still, inasmuch as intellectual curiosity and lively imagination count for much even in these sciences, the laudable ambition and exceptional talents of a few may in time make up for the deficiencies of the many in this regard.

The development of philosophy in Japan is characterized by the same temperamental features. It has hitherto taken two principal directions and has been either practical — a philosophy of conduct — or speculative as a semi-religious and intuitively mystical theory of reality and of human life. The practical philosophy of Japan has derived its inspiration and its form of development chiefly from the Confucian ethics; it has therefore been the guide of notable statesmen and warriors, the doctrine of great teachers (who in Japan as everywhere else in the world, have been the chief influences for molding the national life and national destiny), and the inspirer of the spirit of Bushido of the Samurai class, who have been the strength alike of the Old and of the New Japan. The speculative form of philosophy has derived its sources principally from Buddhism. But nowhere else has the stimulus of the Buddhistic view of the world and of human life produced such a variety of more or less harmonious, but also, in their details, conspicuously or subtly conflicting speculations, as among the Japanese. In general these speculations, which are essentially considered different varieties of one kind of philosophy, follow the Indian type. They are poetical, mystical, intuitive, symbolic and generally vague and inconclusive. They do not, however, anywhere attain the symmetry or proportions of the best examples of the speculative thinking of India. A philosophy that aims to base itself frankly and intelligently upon the particular sciences, and to attain a systematic and scientific whole by the use of logical methods, is neither easy nor congenial for the sentimental temperament. But the Oriental type of philosophy, as modified by the mental characteristics of the Japanese, has its own place and value in the development of human reflective thinking.

The race-temperament and mental characteristics of the Japanese have shown themselves most conspicuously, and even resplendently, in two ways: the chivalry of war and the exquisite sympathy, taste and skill of art. Brave, proud-spirited, governed by sentiments attached to the forms of action becoming to the class, or rank, and appropriate for personal relations, rather than by considerations of either a utilitarian or strictly ethical character — such has been, in general, the character of the Japanese in war. Even through that unhappy period, during which the feudal lords and military chieftains were occupied with the attempt to exterminate each other, the same character was

maintained essentially unchanged. To act as "in honor bound," whether under the principle of *noblesse oblige*, or under the sense of obligation to render unquestioning service to one's superior, has been the rule of the true-spirited Japanese. And no Christian knighthood in mediæval Europe produced higher examples of devotion to honor and to duty — however mistaken the particular form which this devotion may have taken — than have characterized the entire history of Japan. Indeed, the way in which the spirit of chivalry descended upon all the orders of the people in their conduct of their war with Russia is one of the marvels of human history.

The artistic temperament of the Japanese, under stimulation and guidance from teachers and examples from China and Korea, and from their own physical environment, has responded with a form of art which, in many of its characteristic features, is unique. The paintings, sculpture and literature which were the more direct product of the philosophical and religious conceptions of Buddhism (especially for a thousand years from the 7th century onward) closely resembles, in many of their principal features, the art of mediæval Christian Europe. But it is in their representation of natural objects, or their decorative art when natural objects or suggestions from nature are employed, that the artistic imagination and achievement of the Japanese is most distinctive and most admirable. Here we find a quickness and delicacy of perception, a tenderness and depth of sympathy, a wealth of suggestiveness which knows how to address the appreciative soul without details that obscure and confuse, such as have been nowhere else developed to the same degree. These qualities of Japanese art are the direct result of the race-temperament and mental characteristics of the people, as they have already been described. These aptitudes have not only produced celebrated artists and schools of art, but have also — which is a more difficult and distinctive thing — developed a people penetrated throughout with the appreciation and love of the beautiful, whether as produced by natural forces or by human skill. Emperors, shoguns, warriors and abbots and monks write poetry; contests of skill in poetical composition become interesting and exciting court functions; the ceremonials connected with the viewing of the cherry-blossoms or the chrysanthemums, or with the making of tea, are diligently cultivated by the nobility and by the leaders of the nation. On the other hand, peasants, fishermen and coolies look in an admiring and worshipful way upon what of nature's life-work seems to other peoples trivial and uninteresting; they, too, collect and cherish pretty stones, shells, etc., treat with personal affection flowers, grasses and shrubs, and take a sentimental pleasure in moon-viewing, in listening to the chirping of the cicada or the *kirigirisu*, and in the beauties of the temple grove or its treasures of brasses, carvings and kakemonos. A branch just thrown across a misty sky, a bird just alighted upon a lotus-stem and opening its throat for song, a fish swimming against the current, as well as a tiger lapping water from a stream, or engaged in a life-and-death struggle with another tiger, the head of Fuji reflected in Lake Hakone — such are the themes which, with infinite variation in details, inspire both the pictorial and the poetical art of the Japanese. And if the critic is inclined to bring against such work the charge of those weaknesses which are undoubtedly characteristic of the æsthetical products and conceptions of the sentimental temperament, he may be reminded that the strength also of this kind of art consists in just this — its tender and sympathetic appreciation, and suggestive reproduction, of what a coarser taste regards as trivial or indifferent. That the Japanese are capable of historical painting in a spirited and large style, their past endeavors would seem to make clear. And when their pictorial and poetical compositions come again under the inspiring influence of philosophy and religion, there is good reason to hope that their artistic efforts of the similar *motif* and character will greatly excel those to which Buddhism gave birth. See HISTORY OF JAPANESE FINE ART.

In estimating the moral characteristics of the Japanese it is absolutely essential to determine what we mean by morality. In the comprehensive but strictly appropriate meaning of the word, all races have essentially the same moral character. That is to say, they all have preferred forms of conduct, make value-judgments of the ethical type, are stirred and guided by feelings of obligation, approbation and disapprobation, merit and demerit, in view of different kinds of conduct; and they all hold themselves and others responsible under some theory of a voluntary self-control. As to what particular forms of conduct are preferred, and have attached to them the appropriate feelings, and as to what in action is deemed morally right or morally wrong, although there is really a much more fundamental agreement than is ordinarily supposed, there exists, of course, a great variety both of opinions and of practice.

With this general truth assumed, we may safely declare that the Japanese are as truly moral as any other race of civilized human beings. But the particular form which the moral code and the practice approved by the public conscience have taken has been chiefly shaped by the Confucian ethics, with modifications from the Buddhist religion. As has already been explained, the central principle of this ethics is loyalty — shown, according to the prevalent circumstances and relations, to the emperor as the civil, military and religious head of the nation, or to the liege-lord or military chieftain, to the parent, to the clan, to the sworn ally or friend. This principle of loyalty is oftentimes so overpowering in its influence as to obscure the other obligations of a symmetrical moral law, and even to produce startling and almost grotesque effects. For example, while it developed a carefully regulated code of suicide and blood-revenge, it also fostered the unreasonable and insane feeling of obligation to commit hari-kari for the vindication of one's own honor, or murder in the execution of vengeance upon others. But when inspired by a worthy cause and guided by a due amount of practical wisdom, it has, as has already been said, been productive of a most admirable type and of many splendid examples of a noble devotion to moral ideals. The less obtrusive, but from the Christian point of view no less important, virtues of pity, kindliness, humility and resignation owe their existence and their cultivation, here as everywhere, largely to the influences of religion.

In connection with this explanation of the Japanese type of morals, another consideration is not without importance. This kind of morality is personal, rather than theoretical or legal, in the more restricted meaning of the latter term. But it is also, of course, an affair of custom; hence the right and wrong of conduct is determined, not so much by the application of abstract principles, or of a so-called moral law, with its unconditional imperative and its universal claims, as by resort to the appeal to what is *proper* under different personal relations. In the virtues of gratitude and personal devotion the Japanese are not excelled, and probably are not equaled, by any other people.

The relative absence of an established code of business morality, and the low condition of business morals, among the Japanese, is frequently remarked; and the fact cannot be denied. It does not, however, show any fundamental deficiency in the moral consciousness of the people, or even any relative inferiority in the average grade of the public morality in general. The deficiency is to be explained as growing out of historical conditions. For in the first place, in the Old Japan men of honor did not engage in business; they did not even in general regard the getting and expenditure of money as a matter that came immediately into touch with their right to consider themselves men of honor. There were, indeed, some honorable men in trade; but the honorable class did not, and could not, engage in trade. Besides, the considerations which influenced all classes in their financial transactions with each other were of the same personal sort, to which reference has frequently been made. Not the keeping of one's word or contract, as such; not the being fair, honest and truthful with all as a matter of either principle or policy; but the being loyal to the person to whom your loyalty was pledged — this consideration overcame and often extinguished all other considerations. At the present time, a great crowd of untrained and uninformed multitudes, from the lower and the lowest classes, without experience or established moral principles and reputation, have rushed into all the various branches of labor, trade, manufacturing and other forms of business. If, however, as seems probable, and even fairly certain, the instruction of the government schools, and the experience of life, are permitted to mold and to guide the inherited temperament and prevalent mental and moral characteristics of the people, the Japanese will succeed in attaining the front rank of honor in the pursuits of peace, as they have certainly already attained that rank in the science and art of war.

As regards their religious nature and development the Japanese do not differ essentially from other peoples of the same grade of race-culture; while their more or less important characteristics of religious belief, sentiment and practice correspond well to the national type of character. Religious superstitions of all the various kinds have flourished among the ignorant, here as elsewhere; although those of the more dark and cruel kind, such as characterized the Aztecs and much of northern Europe, and are to-day prevalent in Africa and some of the South Sea Islands, do not appear ever to have taken a similar hold upon the Japanese. The physical horrors of the popular Buddhistic hell have been relatively impotent in Japan, either as inspiration or as restraint. Myth-making and miracle-mongering, such as result from the application of a lively imagination to religious and semi-religious conceptions, are nowhere more abundant. Invisible, divine spirits of all sorts, both good and evil (but chiefly kindly), dwell near to man and are ever ready to enter into personal relations with him. The religion of nature-worship in all its manifold forms and manifestations is inseparably connected with the æsthetical sympathy and artistic appreciation of natural objects and phenomena. While ancestor-worship and hero-worship both spring from and contribute to those sentiments of loyalty and devotion which are the spiritual impulse and moral principle of what has been noblest in the past life of the nation.

When religious belief develops into a monotheistic faith, the conception of God is apt to be clouded by an imperfect apprehension of the nature of Personality and an inadequate estimate of personal values. Thus a tendency to a mystical and vague, rather than a logical or scientific pantheism, controls the thinking and shapes the conclusions of the philosophy of religion, or theology, among the Japanese; and agnosticism or atheism in religion is rather the result of indifference, or of intellectual weariness, or of the affectation of independent and modern views, than of scientific deductions or systematic reflection. When, however, the Being of the World is clearly apprehended as the Ideal of perfect Ethical Spirit, and man's relations to this Being are regarded as best symbolized under such terms, of a personal significance and value, as Lord, Father and Redeemer, the characteristic temperament of this race quite naturally and spontaneously, as it were, produces examples of religious devotion, self-sacrifice and heroism, which have rarely been equaled, and have never been excelled, in the religious history of the race.

The question arises, whether these so-called racial characteristics of the Japanese are not rapidly changing under the greatly changed conditions of the modern life — whether, indeed, they have not already changed essentially, and are destined to still greater changes in the future. How, then, can they properly be regarded as *racial* at all? Modern science, modern business, enlarged ambitions and opportunities for foreign intercourse, but especially what we may call the «democratizing» of the people (a process going on over all the world), are undoubtedly working marvelous alterations in the mind and conduct of the nation at large. We believe, however, as yet that these alterations are not inconsistent with the appraisal of the racial characteristics, in respect of their elements both of strength and of weakness, as it has already been somewhat minutely made. It is a notable source of our confidence in the future development of Japan that, under enormous difficulties in the past, and frequent apparent crises in its more recent period, the Japanese government and people have shown themselves equal to trying emergencies.

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5 HISTORY OF THE EMPIRE TO 1889. Introduction.— The Japanese Empire has been ruled for above 25 centuries (2,567 years) under one unbroken line of sovereigns since the Emperor Jimmu, whose 123d descendant is the present emperor. The people may be justly proud of their long history, the pages of which have never been polluted by any foreign conquest, and of that matchless continuity of their illustrious rulers, whom they never tired of revering and loving, even while political supremacy was in subjects' hands. Perhaps we may seek the main source of the harmonious unison of ruler and subject in that patriarchal administration adopted by Japanese from the earliest age; and besides, the singularly harmonious temperament of the people and the isolated position of their islands in the sea seem to have contributed much toward forming a solid nationality.

Reliable calendars first came into use in Japan early in the middle part of the 7th century of the Christian era, so that the genuineness of dates given by ancient chroniclers to events lying still earlier must be considered doubtful. Modern specialists affect to find a prolongation of 500 to 600 years in that part of Japanese history, and that the Christian era is one century later than the Japanese.

The period prior to the Emperor Jimmu is called "Kamiyo" ("Age of Deities"), and is filled with a mixture of legends and mythology relating to deities, regarded as ancestors of the emperor, and their administration in the country. Among others, "Tenshodaijin" or "Amaterasu-o-mikami" ("Deess Shining in Heaven") plays, in this period, the most important rôle as the lineal ancestress of the imperial family. Her throne was on "Takama-ga-Hara," the locality not yet ascertained, and it was she who pronounced that celebrated edict: "The Imperial family shall ever prosper as sure as the heaven and earth," and bequeathed to her successors the jewels, mirror and sword, venerated as the three sacred insignia of sovereignty.

The historic period may be divided into three great periods: (1) The Age of Imperial Administration; (2) the Age of Military Dictatorship; (3) the Restoration and Constitutional Imperial Administration; and these further sectioned into minor series.

THE AGE OF IMPERIAL ADMINISTRATION.

1. The First Emperor Jimmu and the Development of the Empire.— The Emperor Jimmu, the first emperor, valiant and wise, left with his forces the old palace of Hyuga, in the southern part of Kyushu and settled in Yamato, the central part of Japan. There subduing the aborigines called "Cave-Dwellers" and some nobles who had migrated there from Takamaga-Hara in a still earlier period, he was crowned as emperor, and ordained the duties of his subjects of merit and those nobles who became submissive to him, including military affairs, rites, local administration, etc.

Such a distribution of duties was extended even to subaltern subjects, and as the original holder of an office bequeathed it to his son, who again passed it to his son in succession, names of professions in the course of time came to denote families themselves. These families possessed retainers and land property, and titles "Kabane" as Omi, Muraji, etc., varying according to the family dignity, were conferred by the emperor upon their headmen. Otomo-no-O-muraji, Mononobe-O-muraji, Nakatomi-no-O-muraji, Soga-no-O-omi, etc., were the most influential of these titled families. If the need arose these families were to take arms for the emperor — the very centre round which they were firmly united.

In the reign of the Emperor Sujin (the 10th) four generals were sent in four directions to extend the imperial authority. A system of taxation was fixed for the first time, industry encouraged and communication facilitated. Thus under the emperor the country made conspicuous progress.

Two rebellious tribes, however, arose in the west and the north, the former with the name of "Kumaso" and the later "Yezo," to subdue which the Emperor Keiko, the grandson of the Emperor Sujin, dispatched his son, Yamato-dakeru-no-mikoto. Being completely freed from internal trouble, attention was turned to Korea, whose southern portion was already in Japanese possession. The narrow channel separating Korea and Japan had been crossed constantly since the days of the prehistoric age.

The Empress Jingo, the wife of the 14th emperor, attempted an expedition to Korea, herself leading the forces, and succeeding in making nearly the whole of Korea dependent on Japanese authority.

The conquest of Korea had an important significance, not only because of the tribute she annually brought, but because of the liberal introduction of Indian and Chinese civilization, for at that time Korea was far ahead of Japan in culture. A number of Chinese and Koreans were naturalized in Japan and various new arts were cultivated by them. In ancient Japan the gentlefolk were divided into three classes: (1) Those descended from sovereigns; (2) those descended from deities of the prehistoric age; and (3) those descended from naturalized foreigners, as above mentioned.

In the reign of the 29th emperor, Kimmei, in 552 A.D., the Korean envoy introduced images of Buddha and copies of the Sutras and strongly commended the virtues of Buddhism. Mononobe and Soga, two influential families who held great political antipathy toward each other, were widely separated in their opinions concerning the new religion, the former against it and the latter for it. Buddhism, however, having found an able advocate in the renowned Prince Shotoku, the Soga family at last overcame the anti-Buddhist party.

The Prince Shotoku, being charged with the regency of the 33d empress, Suiko, executed reforms in various departments. He laid down, for the first time, a constitution containing the essentials of politics and ethics; introduced the use of the calendar; dedicated to Buddha a number of magnificent temples, and in 607 A.D. the first authorized ambassador was sent to China with an aim of promoting international intercourse. The arts of architecture, sculpture and painting made marked progress with the steadily growing popularity of the new creed, which necessarily led to the construction of many places of worship.

Thus the introduction of Chinese learning and Buddhism was the most significant epoch-making phenomenon in the whole range of

Japanese history, and Buddhism left lasting traces in the national customs, disposition, and even in the politics of the nation. The reign of the 35th empress, Kogyoku, the loyal Nakatomi-no-Kamatari assisted Prince Naka-no-Oye and succeeded in checking and destroying the arbitrary exercise of power by the Soga family.

2. The Era of the Taikwa Reformation.— On the fall of the Soga family, the 36th emperor, Kotoku, came to the throne, and with the help of the heir apparent, Naka-no-Oye, and acting on the advice of Kamatari and others, inaugurated, in 645 A.D., the famous reforms known in history as the Taikwa Reformation, after the name of the era which was settled upon for the first time.

In that reformation, in order to remove the wide interval between the rich and the poor, all lands and people in the possession of private individuals were confiscated by the state and distributed among the people with certain conditions. The Prince Naka-no-Oye reigned as the Emperor Tenchi, and established, based on the Chinese models, the various laws of punishment, administrative organization, education, conscription, taxation and other civil codes. Afterward, in 702 A.D., these laws, which go by the name of Taihoryo, were supplemented and revised and were transmitted to posterity for a long period. The emperor subdued the tribes of Yezo and Shukushin (in Manchuria), so that the imperial authority was made known even in the modern Hokwaido. Korea, however, which had been the source of many troubles, was abandoned in this reign.

3. The Nara Epoch.— We now enter into what is known as the "Nara Epoch," celebrated for its politics, Buddhism and arts.

While the 43d empress, Gemmyo, reigned, the seat of the imperial government, subject till then to frequent removals, was laid at Nara in Yamato (710 A.D.), and the palaces, and city and government buildings were planned to meet that international intercourse which was gradually growing close between Japan and China, the pristine simplicity being found unsuited to the capital.

One of the most noteworthy events in this epoch is the upheaval of the Fujiwara family, descendants of Nakatomi-no-Kamatari, an eminent leader in the Taikwa Reformation. Fubito, his son, also achieved deeds of merit; and Fubito's daughter was the first instance of a subject being raised to imperial consort. Except a short interruption caused by internal quarrels, the Fujiwara family increased more and more in its authority, until the zenith was reached in the period called the "Heian-cho Epoch." In that period the subjugation and cultivation of the Yezo district and the encouragement of agriculture were noteworthy.

In accordance with the provisions of the Taihoryo, a university was established in the capital as well as local schools throughout the provinces, with the aim of training government officials — the subjects chiefly taught being law, history, mathematics and the Chinese philosophy. Hence in that epoch scholars versed in those lines of learning were very numerous, and it was then that those historical and geographical accounts of the Kojiki, Nihon Shoki and Fudoki were compiled. Many students proceeded to China to finish their education, and some, such as Abeno-Nakamaro, obtained high position in China. Men and women of that epoch wrote good Japanese poetry, which is preserved in the collection named Manyoshu. In that age the Japanese syllabaries, Kata-kana and Hira-kana, were invented to be substituted for the inconvenient Chinese ideographs.

Among the events of the epoch none is more noteworthy than the wide spread of Buddhism. This result may be attributed to the fact that it found many fervent devotees in the imperial family. The Emperor Shomu built provincial temples (Kokubun-ji) for nuns and priests and endowed them with liberal donations. He moreover had a huge image of Buddha constructed, and put it in a large temple, Todaiji, at Nara, perhaps the largest wooden edifice the world has ever known. Record says that the Emperor Shomu adopted the tonsure and took a Buddist appellation. The Empress Komyo, his consort, was also zealously devoted to Buddhism and founded a charity-hospital for medical treatment, and measures were taken also for rescuing foundlings. Among many priests of high reputation, Gyogibosatsu is recognized as the most eminent. He and other high priests who successively rose to fame were not satisfied with the mere preaching of doctrines, but showed great activity in building bridges and roads and teaching the people to be industrious. There were, of course, priests who abused their religious authority — the destroyer of one of whom was the still celebrated loyal Wake-no-Kiyomaro. Carpenters, from the practice acquired in building temples, learned how to construct large edifices, and the workmanship of the temple idols is wonderful and never fails to dazzle those who visit Todai-ji, Yakushi-ji and other old temples at Nara. Painting and weaving also made tremendous progress, and the storehouse called Shoso-in, formerly forming part of the Todai-ji and now in the imperial possession, witnesses how far the civilization in that epoch advanced. It contains things used by the Emperor Shomu, among which are several articles illustrating the intermingling of the culture of India, western Asia and even Europe through the Chinese, and contains the census register, the Book of Taxes, etc., as old as 702 A.D. The wooden copies of Sutras, contained in many thousand small pagodas, sculptured by order of the Emperor Shomu, are perhaps the oldest extant samples of wooden printing. While the capital attained a high level in this epoch, it is undeniable that the rest of the country was still in a state of comparative ignorance.

4. Heian-cho Epoch.— In the reign of the 50th emperor, Kwanmu, the capital was transferred to Heian-kyo, 794 A.D., perhaps for administrative purposes. It was the modern Kioto, which is, however, only half the size of the original. There more than 70 emperors reigned for above 1,070 years, until the great Meiji Restoration. The interval which separates 794 A.D. and the year of the establishment of the Kamakura Shogunate, is known in history as "Heian-cho Epoch." Another salient event in this reign was the complete subjugation of insurgents in the eastern Yezo districts by sending there Saka-no-uye-no-Tamuramaro.

Several reigns from Kwanmu to the Emperor Nimmyo, his grandson, comprise the most

prosperous part of the epoch. Learning made a marked advance, and the Emperor Saga is said to have been unique in his penmanship. Besides, many private schools were started by the court nobles.

Buddhism found two more able champions in Saicho (Dengyo Daishi) and Kukai (Kobo Daishi), the former of whom founded Yenryaku-ji on Mount Hiei, and the latter Kongobuji on Mount Koya. They are said to have taught the identity of the deities of Shintoism, the native religion, with those of Buddhism, which subsequently won the strong devotion of the people of all classes. Buddhism accordingly became the predominating factor in settling all matters relating to political, military and social occurrences. But Shinto shrines, such as Ise or Kamo, always held the people's hearts even in this ascendant age of Buddhism.

5. The Zenith of the Fujiwara Family.—The Fujiwara family which sustained a loss of prestige for a time again rose to an eminence when Fuyutsugu was appointed to a vital position called Kurodo-no-Kami. His daughter was elevated to be an imperial consort, and bore a son, who came to the throne as the 55th emperor, Montoku. With Yoshifusa, son of Fuyutsugu, the Fujiwara family increased its power, for he was the first subject appointed Chief Minister of State, for which office till then none but imperial princes had been deemed available. Moreover, he was charged with regency over the 56th emperor, Seiwa, his grandson, who was only nine years old when enthroned. Mototsune, his son, was appointed "Kwanbaku," and after a time the custom of appointing the ex-regent to that position of importance became fixed. It seemed indeed as though all the highest offices of state had become the exclusive monopoly of this family.

The Emperor Uda, being of a sagacious turn of mind, contrived to put a check on the arbitrary power exercised by the Fujiwara family by bestowing an eminent position on Sugawara-no-Michizane. Michizane's banishment, however, was soon accomplished by Tokihira, a minister of the Fujiwara, and his colleagues in 901 A.D. Thus the invulnerability of this family was once more demonstrated.

Although the next emperor, Daigo, was celebrated for his illustrious virtues, and scholars and artists like Ki-no-Tsurayuki, Ki-no-Haseo, Miyoshi Kiyoyuki, Kose-no-Kanaoka, etc., were fostered under that reign, under an appearance of tranquillity and grandeur there lurked elements of effeminacy and corruption. The laws of Taihoryo were gradually being relaxed, and the arbitrary power of the Fujiwara family became uncontrollable.

While enjoying such an arbitrary exercise of power, the Fujiwara family was naturally subject to internal disturbances arising from the selfish ambitions among them. Every prominent member of the family sought to increase his own authority by becoming closely related to the imperial family. At last, Michinaga (about 1,000 A.D.) became supreme and represented in himself the zenith of that splendid family. His three daughters became the consorts of three successive emperors and he was grandfather of three emperors. A writer depicted the events of these times in a work to which he gave the title 'The Annals of Grandeur.'

This epoch was distinguished by great gaiety and splendor. Nobles lived in spacious and grand houses, dressed lavishly and spent most of their time in reunions of poetry and music and dilettanteish observation of nature. Japanese poetry, however, made a marked advance. Ki-no-Tsurayuki, by order of Emperor Daigo, compiled the "Kokinshu," a collection of the best poetry, and this was followed by 20 similar collections. Another noteworthy fact is that national literature began to develop perceptible activity, while the Chinese literature lost much of its sway, owing to the custom of sending ambassadors to China being abandoned. Thus Chinese poetry was supplanted by national verses; and romance, sketches, etc., were written in the national syllabary. Tosa-Nikki, Genji-Monogatari, Makura-no-Soshi were the productions of most renown, and many lady courtiers in the reign of the Emperor Ichijo, and at the time when Michinaga was in power, occupied positions of literary pre-eminence. In short, while the period of the imitation of Chinese culture was passing, the national literature was steadily growing.

While the nobility in the metropolis were devoting themselves almost entirely to pleasure-seeking, administration in the country districts was entrusted to unprincipled officials. It was an important feature of the Taikwa reforms that all the land in the country became state property, and at the same time was allotted to individuals under certain conditions, which, however, in the course of time, fell into neglect. The rich acquired large tracts: to nobles and temples land property was granted, and, moreover, uncultivated lands were suffered to remain in the possession of individuals to get them cultivated. Cunning people evaded the public duties by nominally transferring their lands to nobles and temples, while they themselves acted as stewards. Thus the land of private possession having greatly increased, not only the power of local authority, but also the revenue of the government gradually diminished, and became one of the chief causes of the decline of Imperial administration.

On the other hand the rise of the military clans is a most noteworthy event in this epoch. During the reigns of the Emperors Kwammu and Saga the plan was introduced, mainly from the financial point of view, of reducing some of the Imperial princes to the rank of subjects and giving them family names. Taira (Heishi) and Minamoto (Genji) were the most important instances. Some of these reduced princes acquired large influence in the districts administered by them, and each trained a large body of retainers in the arts of war, availing himself of the inefficiency of the conscript laws of the Taihoryo. Such was the origin of the military clans.

In 939 A.D., a man of the Taira clan, by name Masakado, in the eastern provinces, and Fujiwara-no-Sumitomo of the Fujiwara clan, in the western, rebelled against the Imperial authority, but were immediately defeated. These revolts afforded important occasions for clan ascendency. In 1031 A.D., Yorinobu, a grandson of Tsunemoto, who defeated Sumitomo, achieved success in the Revolt of Tadatsune of the Taira clan, and the two insurrections were quelled respectively by Yoriyoshi, the son, and Yoshiiye,

the grandson. Previously, in 1019 A.D., Takaiye of Fujiwara frustrated the invasion of Kyushu by plundering tribes of Toi of Manchuria. His descendants secured a military stronghold in Kyushu. Thus, while the Fujiwara family was rapt in dreams of grandeur, the reins of power came into the hands of the military classes, composed of the clans Minatomo, Taira, and a branch of Fujiwara.

6. The Age of the ex-Emperors.— The unbridled omnipotency of the Fujiwara family began to wane in the reign of the 71st emperor, Gosanjo, who was sagacious and austere and had no lineal relations with the Fujiwara family. His elaborate scheme of reforms, however, was not realized because of his untimely death. The Emperor Shirakawa, also a man of resolution, interfered with state affairs even after his abdication of the throne in 1086, which was the earliest precedent of that peculiar sort of government called Insei (Ex-Emperor's Administration).

Luxury in dress, magnificence of dwellings and fanatic devotion to Buddhism were the chief features of this epoch. Large temples in the vicinity of Kioto, such as Yenryaku-ji, Onjo-ji, Kofuku-ji, etc., possessed rich properties, and each maintained thousands of sacerdotal soldiers, who if dissatisfied with any measures of the government, armed with bow and arrow, would make descent on Kioto in great force to obtain their will. Accordingly, it was always to military men in the provinces that both the emperor and the Fujiwara family resorted when feuds broke out or the Buddhist soldiers acted lawlessly, and thus the elevation of military men to positions of power was most natural.

The struggle for political pre-eminence by the Fujiwara family and the long years of moral corruption of the Heian-cho epoch resulted in a disturbance in 1156 A.D. In that year the 76th emperor, Konoye, died, and the ex-Emperor Sutoku, seconded by Fujiwara-no-Yorinaga, Minamoto-no-Tameyoshi and others, tried to ascend the throne once more; whereas the Regent Tadamichi, brother of Yorinaga, not being on good terms with his brother, with the help of Kiyomori of the Taira clan, and Yoshitomo, son of Tameyoshi, crowned Goshirakawa emperor. Thus a bloody war called "Hogen Disturbance" ensued, which ended in the rout of the ex-emperor. In this way the military classes forced their way into the administrative authority of the state. Three years after the Hogen Disturbance, an insurrection arose, known in history as the "Heiji Disturbance," in which the power of the Minamoto clan was almost completely broken by the loss of Yoshitomo, its leader, and the Taira clan speedily attained ascendency. The period (1166–85) is called the Taira Age. Kiyomori, by virtue of his success in the two disturbances, was appointed Chief Minister of the State, and all his kinsmen and followers were given prominent positions, and the reign of the Fujiwara family was practically over.

Arbitrary power, and especially the arrogant attitude of Kiyomori toward the ex-Emperor Goshirakawa, greatly incensed his opponents, and Minamoto-no-Yoritomo, a son of Yoshitomo, and Yoshinaka, his cousin, raised a force of troops in compliance with the mandate of the Prince Mochihito, a son of the ex-emperor, and after several battles drove out the Taira party from Kioto. In the tragic sea-battle at Dan-no-ura (1185 A.D.) the Taira clan was completely crushed by the forces of Yoshitsune, Yoritomo's younger brother.

THE AGE OF MILITARY DICTATORSHIP.

1. The Kamakura Epoch.—After a decisive battle at Dan-no-ura, Yoritomo was created Grand General of Expedition (Seii-Taishogun), founded the Shogun's government at Kamakura, and the Age of Military Dictatorship of about 700 years begins. Under a pretext of arresting fugitives of the Taira clan, or stray followers of Yoshitsune — his able brother with whom he was on bad terms — and of preventing disturbance in the future, Yoritomo had his relatives and partisans appointed as High Constables in each province and as superintendents of both public land and of nobles' estates, and applied a certain system of taxation on all land property (1185 A.D.). Thus Yoritomo, acting on the sagacious advice of Oye-no-Hiromoto, a man of great statesmanship, succeeded in becoming the master of the state administration, and while the power of the former provincial governors appointed by the Imperial court and the headmen of nobles' estates gradually lost their authority, these newly appointed military officials steadily grew into what were called "Daimyos," or feudal lords.

Profiting by the unfortunate precedents of the Fujiwara and Taira families, the mode of life laid down by Yoritomo was simple and frugal. Bravery, honor and loyalty were proclaimed the highest virtues, and if one were found guilty of any serious fault he must atone by suicide. Thus at this period the rules of the Japanese chivalry were clearly prescribed, though the spirit was not new. This soldierly spirit prevailed in literature and amusements, and this warlike age also witnessed the rise of the Zen sect of Buddhism.

The line of Yoritomo came to an end in the third Shogun, and after that the government fell into the hands of the Hojo family to which the Yoritomo's consort belonged, although the nominal Shogun was brought from Kioto.

In 1221 A.D. the Emperor Gotoba attempted the destruction of the Hojo family, which attempt, however, utterly failed, and the property of those who espoused the Imperial cause was confiscated and divided among the Hojo's followers. Some of the Hojo's family were stationed in Kioto to restore order, and to act as overseers, and, by the judicious and generous administration of such excellent statesmen as Yasutoki and Tokiyori, that family enjoyed the widest popularity. Yasutoki left a knightly code of 51 articles, which was respected as the basis of laws throughout the military dictatorship up to the Meiji Restoration.

In the reign of the 90th emperor, Kameyama, when Tokimune, the son of Tokiyori, held regency in Kamakura, Kublai Khan, the Mongolian conqueror, sent envoys to Japan seeking her submission, but his proposals were rejected. In 1281 A.D., the Chinese and the Mongolian forces, above 130,000, together with the Koreans, made an invasion into Kyushu, and were defeated. The period of war and anxiety extended over 30 years, but perseverance and final success made manifest the national spirit of Japan.

Troubles about the succession of emperors served as an excellent occasion for the Hojo family to obtain paramount power. The 96th emperor, Godaigo, a daring and wise monarch, lamenting the decay of the Imperial authority, realizing the imbecility of Hojo Takatoki, and relying on the never failing loyalty of Kusunoki Masashige, Nitta Yoshisada and others, at last succeeded in the restoration of administrative authority to the Imperial House (1333 A.D.).

2. Revival of the Imperial Power in the Kemmu Era. The Northern and Southern Courts.—Ashikaga Takauji, a member of the Minamoto clan, and a man of distinction in the late war, knowing the dissatisfaction of the military classes in the partial distribution of rewards, and the court nobles' prejudice against men of arms, saw an opportunity to raise an independent army. Addressing himself to the newly created Emperor Komyo, of the line of the Emperor Gofukakusa, he began a revolt against the Emperor Godaigo, and forced him to seek refuge in the Yoshino-Yama, the celebrated place of cherry-blossoms in the province of Yamato. For a period of 57 years, dating from 1336 A.D., two lines of emperors reigned simultaneouslv, one in Kioto and the other in Yoshino, and this is therefore termed the age of Northern and Southern Courts. On the death of Kusunoki and Nitta, able defenders of the South, the Ashikaga family rose into supreme power. In 1392 A.D., the two Imperial houses were reconciled and united.

3. The Muromachi (Ashikaga) Epoch.—As the Ashikaga family placed the site of their Shogunal government in Kioto at Muromachi, that period is known as the Muromachi Age. The 3d Shogun, Yoshimitsu asserted his authority by destroying such powerful generals as Ouchi Yoshihiro and Yamana Ujikiyo, who had become insolent by reason of their rich estates. He was also notorious for his love of arbitrary rule and luxury, well exemplified in his sumptuous villa, Kinkaku-ji, at Kioto.

When Takauji laid his seat in Kioto, he at the same time sent his second son, Motouji, the uncle of Yoshimitsu, to Kamakura to be governor there; but his descendants growing in power became ambitious, and were finally overthrown. With the fall of the governor at Kamakura, the whole of the Kwanto district was thrown into disturbance.

In the time of Yoshimasa, the 8th Shogun of the Ashikaga line, the disastrous war of Onin broke out (1467 A.D.), occasioned by a succession of troubles in the family of the Shogun and his followers. Hosokawa Katsumoto led one party, and Yamana Sozen the other, and Kioto was the field of battle for 11 years and was miserably reduced to a state of desolation and ruin. Palaces and temples were burned to the ground with irreparable loss of treasures and documents.

After the war, territorial nobles returned to their castles and would not listen to the central government. This age of constant contest, extending from the end of the 15th century to that of the 16th, is denominated the "Period of Military Emergency." Hojo Soun was the most typical hero who attained a position of eminence by the sheer force of sword. In the meanwhile, Uyesugi in Echigo, Takeda in Kai, Imagawa in Suruga, Otomo and Shimazu in Kyushu, Mori in Chugoku were exercising their respective dictatorships at their own sweet will, until the country was once more united under Oda Nobunaga and Toyotomi Hideyoshi.

During a century of continuous military disturbances, literature and the arts made notable progress, for learning was conscientiously cultivated by priests of the Zen sect and poetry still continued to be the favorite pastime of court nobles and even of soldiers. In this age, the "Utai" (a dramatic romanza) made a marked development, together with the "No" dance, and nursery tales became a rich branch of literature. The Shogun Yoshimasa retired from the bustle of the disordered society to the picturesque temple Ginkaku-ji at Higashiyama in the vicinity of Kioto, where he lived indulging in various amusements and especially in the "Cha-no-Yu" (tea ceremonial), and by his refined love of ancient caligraphs, pictures and curios gave a fresh impetus to this brilliant period of Japanese art, which is commonly called the "Higashiyama Period." Ko-hogen Motonbu, one of the greatest masters of Japanese painting, initiated a new style, uniting the showy native school with simple but high artistic taste of the Sung and Yuan dynasties of China, and became the founder of the Kano School.

While the peaceful intercourse between Japan and China was maintained by the Shogunate the people of the littoral districts of Kyushu, Chugoku and Shikoku, after the repulse of the Mongolian invasion, made frequent raids into China and Korea, which reached a climax in the age of the Military Emergency. In China the name of "Wako" ("Japanese raid") was given to these pirates and they were greatly dreaded. For the introduction of the gun by the Portuguese in 1543 A.D., the propagation of Christianity by Xavier, etc., the dispatch of ambassadors to the Roman Pope by various magnates of Kyushu. See FOREIGN RELATIONS.

4. Oda and Toyotomi Period.—In this state of the local autonomy, Oda Nobunaga greatly distinguished himself and was charged by the 106th emperor, Ogimachi, with the pacification of the city of Kioto. As the guardian of the Shogun Yoshiaki, he entered Kioto, where he repaired the Imperial Palace, restored the poor nobles and established order. In 1573 A.D. the Ashikaga Shogunate terminated with the expulsion of Yoshiaki by Nobunaga. He subjugated the Takeda clan of the province of Kai, and was about to start on a campaign against the Mori clan of Chugoku, when he was suddenly attacked and killed by a vassal (1582 A.D.).

Upon Nobunaga's death, Toyotomi Hideyoshi, his tried vassal, afterward Taiko, perhaps one of the most renowned participators in Japanese history, took his place. He subdued all the important territorial nobles in nine years and the restoration of domestic tranquillity was at last established (1590 A.D.). When the Emperor Goyozei paid a visit to his newly constructed mansion in Kioto, Hideyoshi settled the Civil List, allotted land property to court nobles, and exacted from all generals an oath that they should reverence the sovereign, and they should not show any disobedience to the "Kwanbaku," which position he held.

Availing himself of the valiant spirit of those times, Hideyoshi in 1592 made an expedition into "Ming," via Korea, seemingly to be avenged of the Mongolian invasion in the Kamakura

Period. The royal palace of Korea was taken by Japanese forces, and a large body of Chinese reinforcement put to rout. Although the Chinese suggestion of reconciliation was accepted by Hideyoshi, the fraud practised by Chinese envoys put him in such a rage that large forces were immediately mustered for the second invasion, which was frustrated by the death of Hideyoshi (1598 A.D.).

Being fully aware of the smouldering sentiments of hostility, Hideyoshi, just before his death, entrusted the administration of the state to the hands of Tokugawa Iyeyasu of Yedo (the present Tokio), who was illustrious for his rank and renown. After the death of Hideyoshi, however, the generals — such as Ishida Mitsunari, Mori, Uyesugi and others — who had served under him, took up arms against Iyeyasu in the cause of Hideyoshi's son, Hideyori. The Tokugawa forces were led by Iyeyasu, assisted by Asano, Kuroda, Kato and others. The opposing armies met on the Sekigahara Plain in Mino, and the Ishida party was utterly defeated, so that the administrative power came wholly into Tokugawa's hands (1600 A.D.).

5. **Yedo (or Tokugawa) Epoch.**— Three years later Tokugawa Iyeyasu was appointed Seii-Taishogun, and founded a Shogunal government in Yedo, which naturally increased in size and grandeur. His administrative supremacy over feudal lords was secured by being generous as well as authoritative. The successor of Hideyoshi, ruling in Osaka, hoped to be restored to the position his father had occupied, and there flocked to his standard many thousands of «Ronins» (unenrolled samurai), but the result was an utter failure. Thus the illustrious house of Toyotomi having been destroyed, the country entered upon a long era of peace.

The measures contained in Iyeyasu's laws for territorial government were of the most prudent nature. To avoid the excessive autonomy of territorial nobles, every feudal lord was required to live every alternate year in Yedo; the construction of castles was placed under strict limitations and by means of a careful territorial distribution, nobles were prevented from forming allies. He knew how to give allegiance to the Imperial family, without surrendering any actual authority. The encouragement of learning and refined manners resulted in obliterating the cruel and rude customs of the people.

Believing it for Japan's commercial advantage that friendly intercourse should exist with Korea, peaceful relations were resumed, and it became a custom to have an embassy of congratulation sent from Korea on the occasion of the succession of a new Shogun. Under Iyemitsu, the 3d Shogun, a man of extraordinary ability, the organization of the Shogunal government was perfected, while the supremacy of the Shogun was conspicuously enhanced. At this time the government rigorously persecuted the Jesuits and their followers as dangerous to the welfare of the country, and Christian converts fled to Shimabara, where their headquarters was at last subdued, in 1638 A.D. It is believed that some of those defeated at Sekigahara sided with the Christians to be revenged on the Tokugawa. Fearing the spread of Christianity, strict laws were enacted for the prohibition of foreign communication, and no foreign vessels were permitted to enter except those of Korea, China and Holland.

About two centuries and a half, from 1615 A.D., the year of the fal. of Toyotomi, down to the Meiji Restoration, was a period of tranquillity, broken once by the Christian insurrection, and in it culture made wonderful progress, and the war spirit perceptibly diminished. During the celebrated era of Genroku (1680–1709 A.D.) when the 5th Shogun, Tsunayoshi, ruled, the highest seat of education was established by the Shogun's order, and the grandson of the celebrated scholar Hayashi Doshun appointed its president. This encouragement of education was imitated by the feudal nobles, who also established schools in their respective provinces, and vied with each other in getting men of learning. The most distinguished of these savants were Ogiu Sorai, Ito Jinsai and Arai Hakuseki. In that period the «No» dance, «Joruri» music and the dramatic play enjoyed wide popularity, and costumes and furnitures were of the most luxurious nature. It was at this time that the famous vendetta of the 47 Ronins took place (1702 A.D.).

The empire being thus busily absorbed in the cultivation of learning and arts, the administration of the Shogunate was characterized by inaction, and the military equipment began to be neglected. The 8th Shogun, Yoshimune (1716–45 A.D.), on assuming administrative control, set himself to reorganize the government by introducing the Kyoho reforms. He retrieved the poverty of the whole country by the enforcement of frugality and economy, and fostered the popular taste for martial exercise. He collected also a volume of laws, called «Hyakka-jo,» commended the Dutch learning introduced by Aoki Konyo, and encouraged industry. On the death of the Shogun Yoshimune, the political adjustment relaxed. Matsudaira Sadanobu then became the chief minister and set himself to enforce the Kwansei era reforms. Then succeeded the exceptionally prosperous eras of Bunka and Bunsei (1804–29 A.D.) during which many evil practices crept in, but a great reform took place under Midzuno Tadakuni, in the era of Tempo (1841 A.D.).

In 1853 A.D., Commodore Perry came to Japan with his fleet. Several years before this arrival, both Russia and England had sought permission of the government to carry on trade, but without avail. As the result of various encroachments of the Russians, and the disorderly conduct of Englishmen at Nagasaki, careful measures were taken for littoral defense, and the government ordered that any foreign ship approaching the coast should be fired on. Among the Japanese, however, many who had acquired the Dutch learning spoke against such a violent policy.

On the other hand, the cry of «Loyalty to the Throne» became more and more fervent, for the people had learned how the military families of successive generations asserted their own authority at the expense of that of the Imperial House. The history of the past was widely studied in such a painstaking work as 'Dainihonshi' (History of Japan) compiled by Mitsukuni of Mito and his retainers. The studies of national literature, pioneered by a learned group of men, headed by Kamo-no-

Mabuchi, Moto-ori Norinaga, etc., naturally stirred up still more the people's love for the emperor.

The Shogun's government, though traditionally accustomed to the arbitrary exercise of power, was now perplexed, both by the Imperial court and the popular cry, and the necessity of coming to some terms with America and other foreign powers was felt. Moreover, the Shogunate was disturbed by an internal trouble about the succession. At this crisis, the courageous Ii Naosuke (Kamon-no-kami) was appointed Tairo (Prime Minister), and in 1858 A.D. a temporary treaty was signed with five countries — America, England, France, Russia and Holland, and the succession problem was also settled.

The blame for having taken the audacious step of concluding a treaty without the Imperial sanction was thrown upon Ii, who, however, resolved to settle the disturbance by dismissing, sending into exile or to death all opponents of his policy. Amidst such a hue and cry, Ii was attacked and killed by the Mito Ronins, and the authority of the Shogunate rapidly diminished. The Mori clan of Choshu united with the Shimazu clan of Satsuma with the common view of destroying the Shogunate government. Finding himself confronted by such difficulties, Yoshinobu, the 15th and the last Shogun of the Tokugawa, acting on the advice of Yamanouchi of Tosa, resigned the office of Shogun, and restored the administrative power to the Imperial Court in October 1867 A.D. Thus the Tokugawa Shogunate ended with a brilliant history of 265 years, and the Age of the Military Dictatorship for 682 years came to an end.

Restoration and Constitutional Imperial Administration.

Subsequent to the restoration of the administrative authority and the overthrow of the Tokugawa Shogunate, the Shogun's household troops and some of the territorial nobles, owing to their dissatisfaction with the attitude of the Choshu and Satsuma clans, attempted revolts, all of which, however, were defeated.

In the first year of the Meiji era, that is the year next to the Restoration, the Emperor Mutsuhito (q.v.) issued a declaration defining the basal essentials of his administration, as for instance, that the management of the state should conform to the public opinion; that rulers and subjects should be united for the development of the nation; that the knowledge of the world should be sought in order to make firmer the empire's foundation. In the 2d of the Meiji, the capital was transferred from Kioto to Tokio.

Even after the Restoration, the unification of the national administration was found impossible, for the land and the people were still in the possession of feudal lords. The four powerful clans of Satsuma, Hizen, Tosa and Choshu, therefore, addressed to the sovereign a letter declaring their desire to restore their land and retainers to the emperor, and all other nobles followed the same course. Then the "Han" (fiefs) numbering above 300, were replaced by "Fu" and "Ken" (prefectures), and governors to administrate them were appointed. Thus the emperor came into full control of the land and people which had long been under the sway of territorial nobles.

Among various minor reforms, the distinctions of Kuge (court nobles), Daimyo (feudal nobles), Shi-No-Ko-Sho (samurai, peasant, artisan and merchant) were abolished, and the people were divided into the three ranks of Kwa-zoku, Shi-zoku and Heimin. The cue and swords of men were discarded, and the lunar calendar was replaced by the solar. A new law of conscription was issued declaring every man to be a soldier, and many codes of laws were enacted.

The emperor also encouraged education by giving special attention to it, and the Imperial Rescript was announced to settle the fundamental basis of education. At present, there are numerous educational establishments, including universities, colleges, middle and common schools, etc. Railways, post, telegraph and mail steamers were provided for facilitating communication. Though some conservatives were opposed to the introduction of Occidentalism, foreign civilization advanced with irresistible speed and energy, which advance, however, was happily modified by a strong national sentiment.

In 1875 a senate was organized for legislative purposes, and the assembling of local governors prepared the way for representative government. In 1889 the Constitution was promulgated amidst universal congratulation, and in the following year the first session of the Imperial Diet took place. Thus the constitutional imperial government of the nation was firmly established.

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6. HISTORY OF JAPAN, 1889–1919. The political evolution of Japan from the restoration of the Mikado to supreme power, in 1868, proceeded from the imperial oath given to form a representative national assembly, to limit prerogative and to decide all matters of national interest in accordance with public opinion. Twenty-one years elapsed before this promise was fulfilled. Meanwhile, preparatory constructive measures through local administration, looking to constitutional government were carried out by the men in power; while the discussion of principles by pen and voice went steadily on among the rival parties. Roughly speaking, these were founded by Masanawo Nakamura, and Yukichi Fukuzawa, on idealistic and materialistic theories respectively, in the 60's. Later Iwakura and Ito (q.v.) representing Prussian, and Okuno and Itagaki the British theories respectively, as to the responsibility of the ministers to the sovereign or to the Diet, incarnated the prevailing opinions. On account of the severe criticism of the men in power, through the new force of journalism, and the inevitable first results of free education, the arbitrary "Peace Preservation Act" of 1887 was enforced, which virtually banished all hostile critics from Tokio and imprisoned those who refused to obey. Yet on the gathering of the first Diet in 1890 most of these men, thus roughly handled, held seats. At once began a most vigorous opposition, with the determination to control the budget, to widen the franchise and to secure party government. A survey of 40 years past shows that in the actions and reactions of political parties, although feudalism in form was past, its spirit remained. Whatever the "name or form or ritual word,"

the passionate instincts of clanship, rather than insight into, or devotion to, fundamental principles governed the formation of parties and held men together in a common purpose. In 1870, when feudalism was abolished, there were about 480,000 Samurai (q.v.) or trained intellectual men in the empire. Popular education soon increased this host, also bringing in a new generation reared in modern ideas. Ito, "father of the constitution," and men of like mind, having exercised their power in the school of Stein, Gneist and Bluntschli, the German legists, tried to reconcile in some way the ineliminable element in democratic government — the budget — with ministerial responsibility to the sovereign. On this question cabinet after cabinet was wrecked. The mandate of the emperor was so often invoked as to almost shake the stability of the throne. Finally, Ito had to form the Seiyu Kai, or Friends of the Constitution, to make this instrument work; but still the wreckage of cabinets continued. None except those in continuance during a foreign war lasted over two years, and those fell within a few months. All this time, of 18 cabinets, the real power behind the throne lay in the Genro, or Elder Statesmen, survivors of the Restoration of 1867, whose word with the emperor outweighed the decisions of the Diet, or Cabinet. Moreover these and almost all the others in civil and military office were former southern clansmen. From about 1900 the younger men, educated after and outside of feudalism, have been coming on and the new economic forces transforming society. Henceforth, from the Russian War, political evolution has been a steady contest between the imperialism of a rather military and aristocratic caste and a rising democracy, whose power was especially manifested in the "rice riots" of August 1918. This outburst, though economic rather than political, showed nevertheless the silent revolution wrought by the industrial transition and the new forces of education. These later, in spite of all the efforts — sometimes sufficiently ludicrous — to limit even science, ethics and historiography and make these the engines of government, tend less and less toward arbitrary rule and more and more for genuine democracy. Of late years, wise statesmen, seeing the trend of affairs, have made attempts toward an "Imperialistic democracy." In 1918 following the "voice of democracy" in the "rice riots," and for the first time in Japan's history, a commoner became Premier, with a cabinet, whose members except one or two, had no titles, but were "plain Mr." For the first time, also, since the Restoration, that Premier, Mr. Kei Hara, was a man born north of Tokio. The old days, when the merchant was despised and oppressed and the commoner out of office, were over, and something like party rule had come. Whereas, in 1870, in army, navy, government position or schools, any one but a Samurai was an exception, the proportion, in 1918, of 50 per cent of commoners, in each has since been passed. Except for social prestige or genealogical considerations (of little scientific value where adoption and ancestor worship prevail), the lines of demarcation between the classes, once so rigid, are slowly becoming practically invisible. Much the same thing may be said of matters relating to marriage and the status of woman to whom fresh opportunities are open. The new civil code, passed by the Diet in 1896 (in English 1897), left the way open for reform and the terrific economic pressure because of the industrial revolution, completely altering the structure of the family, has left society in a state of flux. All this has unquestionably prepared the way for "democracy" — but of what type? Imperial, proletariat, or intelligent and educated — one that shall bind the nation preservatively closer to its noblest ideals and save the honor and prestige of the imperial house — the type of Russia or of England? The struggle of parties is now on between the radical Imperialists and those who would look to the English-speaking nations for inspiration, if not for models. A remarkable book by Yukio Ozaki, ex-mayor of Tokio, which appeared in 1918, entitled 'The Voice of Japanese Democracy,' is an index of the crescent national feeling. It remains an open question whether the military phenomena of 1868 within and the Chinese, Russian and World War of 1914–18, which have most attracted the attention of foreigners, have been as important in transforming Japan as the steady development of the national resources. In 1870 a tall chimney on the landscape of Japan was as great a rarity as in Europe before A.D. 1200. Now the face of the country is pitted with these smoke vents and much of the old natural beauty is spoiled by many a stretch of "black country," by factory and mine refuse and by slag heaps (which, however, take the place of the old "famine mounds" of ashes from the cremation fires, "over which no church bells tolled"), while the rush of labor to the cities has brought on congestions, new civic terrors and many new problems of housing and morals which the old theories and measures cannot meet. In days antedating railways and steamers agrarian uprisings and trade troubles were impossible except locally and on a small scale. With the new nervous system, created by the applied forces of steam and electricity, communication had become so easy that the "rice riots" of 1918 were on a national scale. Nothing since the Perry Treaty of 1854, not even wars, has so set the higher classes thinking as this exhibition of the power of the people when able to get together. The same phenomena, especially with the revival of "Korean Buddhism" — as described by Professor Starr in his book of 1918 under this title — shows what may possibly occur even in this oversea province of the empire. The new forces have shown themselves literally potent to "create a soul of life under the ribs of death." Japan's alliance with Great Britain, made, tested and renewed, is still the cornerstone of her policy in Asia, with also — especially since the discrediting of Germany, both morally and materially — a close friendship with the United States. In fact it may be said that Japan has definitely cast in her lot with the English-speaking nations. Yet the home and foreign policies of the nation are inextricably joined — how to provide for an increasing population dwelling on a very limited area of fertility in a mountainous country, and also to keep on good terms with nations that are color-conscious and want no immigration of Asiatics that even so much as suggest a lower standard of living. Japanese statesmen

have frankly confessed disappointment at the results of their two great wars and concerning the new territory gained or old claims confirmed. The comparatively small emigration from the ancient bounds of the three great islands, Hondo, Shikoku, Kiushiu, already containing over 50,000,000 souls, into the thinly populated, but climatically different, Formosa, Yezo and Saghalien has been very far from meeting expectations. Nor are there yet any startling signs of either Korea or Manchuria being flooded with subjects of the Mikado. After two wars, ostensibly in her behalf, and many costly attempts to reform the peninsular kingdom, which, as Ito said, "lacked nearly all the features of a modern state," Japan changed her protectorate to annexation, and, under its ancient name of Chosen, Korea (q.v.) was made a province of the Japanese Empire. While Japan's system of colonization has worked material wonders in Korea and Formosa, the nearness of the Philippines, as revealing the startling difference in Japanese and American ideals and methods, must work for good. At least the optimist hopes and thinks so, while the Japanese government expects to find in the peninsula room enough for all subjects of the Mikado living within the bounds of Morning Calm. We have preferred in this article, following Professor Mikami's clear and able survey, so rich in description of events, as a loyal native sees them, to present within the limits of a brief sketch the philosophy of the facts, rather than marshal an array of dates. Outstanding in the chronology of the past four decades was the decease on 30 July 1912 of the great Emperor Mutsuhito (q.v.), who, from 1868, led his people, magnanimously and with unselfish wisdom, through a reign unquestionably excelling all other in brilliancy, and with few peers as to length of time. Unfortunately, we think, the ancient august and unique title "Mikado" has been relegated to poetry. The term "Emperor" — now made to suffer in repute, because of the downfall of autocracy in a world-wide war — has come into general use. Of Yoshihito, third son of Mutsuhito and now executive head of the empire, the promise already given of one likely to fulfil the hopes of the nation by following in his father's footsteps has been thus far fulfilled. Japan sends her ablest sons to attend the Peace Conference in Paris to settle the results of the Great War and in reasonable hope of a bright future faces the coming third decade of the 20th century.

WILLIAM ELLIOT GRIFFIS.

7. THE JAPANESE CONSTITUTION. Among the jurists of Europe and America, it had heretofore been considered that constitutional government is only compatible with the social and political status of the Western nations, and furthermore that Oriental nations could never adopt this form of government, because they have no common ground upon which constitutional government could be planted; therefore when, in the year 1881, the Emperor of Japan announced, by the Imperial Edict, that constitutional government should be established at the end of 10 years, the peoples of Europe and America thought that he had adopted a mistaken policy.

But the year 1890 came, and the first Parliament was convened in accordance with the Constitution which was promulgated the year before, and has continued ever since. Thus constitutional government in Japan, in spite of many boisterous meetings and much sensational discussions, which are by no means uncommon in Europe and America, must be considered a success.

In order to explain why Japan, one of the Oriental nations, has succeeded in adopting the system of constitutional government, it is necessary to review some of the important facts connected with constitutional movements in Japan during the last 40 years.

On his ascension to the throne after the Imperial Restoration in 1868, His Imperial Majesty proclaimed the five articles of the imperial oath, one of which marked out distinctly the future course of His Imperial Government, in the following words: "We shall henceforth seek knowledge and wisdom in an outside world and establish the National Assembly where the important affairs of State shall be decided by public opinion."

This is the fundamental principle of Japanese national policy, by which all the subsequent changes and reorganization, both political and social, were carried out and consummated. In 1875, the judiciary system was organized by establishing the Court of Cassation, to maintain the unity for the execution of the law, although there were already the District Court, the Provincial Court and the Court of Appeals, but there was no Supreme Court where all the judicial matters in the empire could be decided and unified. In the same year the Senate was established by the Imperial Decree, which clearly stated that in future all important legislative bills be brought by the Cabinet and discussed before the Senate. The changes placed the Japanese government on the same organization as Europe and America — under the three branches of the Executive, Legislative and Judicial. This might be called the first step in the central government to pave the way for constitutionalism in the future.

Now, let us turn to the reorganization of provincial affairs. In 1879, the law was passed in the Senate establishing a Provincial Assembly in all the provinces of the empire. To this Assembly all the taxpayers send their representatives by election, and the governors of the provinces bring the annual estimates, which are discussed and voted upon by its members. Here we find again a system of self-government in local affairs, like that in Europe and America.

As soon as the people acquired the right to discuss and vote upon the provincial expenditures, they naturally desired to have the Parliament opened, where they might discuss and vote upon the national expenditures, in the same way as in the Provincial Assembly. This was urgently demanded by the political leaders outside of the government, as the only means to interest the people in the welfare of the country, and they still further insisted that this was the principle of the imperial oath of 1868. The public speeches and newspaper discussions on the question intensified the demands of the people, which had grown so strong as to compel the government to adopt a policy to open the Parliament much sooner than had been intended, and the famous Imperial Proclamation of 1881 was issued, by which the emperor declared a first Parliament to be opened

in 1890. Thereupon the emperor appointed Marquis Ito to go abroad on a mission to study the constitutions of Europe and entrusted him with the important work of drawing up the draft of a constitution. In 1884, after four years of close investigation of the European constitutions, he returned to Japan, and soon the committee was appointed to prepare the draft under the guidance of Marquis Ito. This committee consisted of the late Viscount Inouye, Marquis Ito and the present writer.

During the five years from 1884 and 1885, Marquis Ito had personally directed the work of the committee and drawn up the draft, which was submitted to the emperor for his approval. In the spring of 1888 the Emperor organized the Privy Council, and opened the meetings to deliberate upon the draft of the Constitution. The first meeting was held in May, and continued until January 1889, and was presided over by His Imperial Majesty in person, who attended every session of the council. After a close deliberation of nine months, the Constitution was promulgated by the Emperor in person 11 Feb. 1889, with solemn and gorgeous ceremony, in the throne room of the Imperial Palace, attended by the imperial families, ministers of state, privy councillors, foreign diplomatic corps, all high officials, and governors and representatives of provinces, and its proclamation was followed by national rejoicings and festivities.

Thus the movement for constitutional government in Japan began at first with the imperial oath of 1868, and was continued in remodelling a political mechanism for a long duration of 23 years, and finally completed by separating the government into the three branches of Executive, Legislative and Judiciary, which are acknowledged principles of constitutional government in Europe and America.

But there is an important difference between the constitution of the Western nations and that of Japan. The constitutions of England and the continent of Europe are really the outcome of a popular uprising against the tyranny of rulers; in other words, constitutional government was demanded and established as the natural right of the people. Consequently even the constitutions of monarchial Europe were drawn up in such a way as to put the greatest stress and importance upon the popular right, and at the same time the power of the sovereign was curtailed as much as possible. The constitutional history of Europe and America is a protest against the encroachment of the sovereign upon popular rights; but the Japanese Constitution emanated from the emperor — fountain of power — and not from the popular right, as clearly stated in the imperial oath. Before the people ever dreamed of a popular right or a Parliament, the emperor had already marked out the policy of constitutional government in future, because his ardent desire was to elevate his country so as to enable it to take rank among the civilized nations of the West; and this is not only his wish, but is in strict accordance with a national policy bequeathed by his imperial ancestors.

Following this national policy, the Constitution was drawn up with strict adherence to, and in preservation of, the traditional history of Japan and the fundamental principle of the imperial government for 2,500 years. However, the form of the Japanese Constitution is practically the same as those of Europe and America; but with this difference, that the texts of the Japanese Constitution contain only the fundamental principle of state; that is to say, the prerogative of emperor, rights and duties of people, powers of Parliament, powers and duties of ministers of state and privy councillors, and judiciary and finance. All these are embodied only in the 76 articles of the Constitution.

Here we naturally meet a question — how can the national affairs be administered under only 76 articles? When, however, we examine the Japanese Constitution minutely, we find that it was drawn up so as to separate as many articles as relate to "Rules and Proceedings of Parliament," "The Laws of the Election of Members of Parliament," and "The National Budget," and these are embodied in the supplementary laws of the Constitution, and enacted at the same time. Why was such a separation necessary? Because when a first Parliament is opened, the government as well as the members, in discussing national affairs, might find it necessary to make some changes in the articles therein. If such a change affect the text in the Constitution, it might afford a good opportunity for some unscrupulous politician to try to change the fundamental principle, and even if he failed in his attempt, it could certainly lessen the weight of the Constitution, but if these articles are separated from the constitutional text, then they can be easily changed and amended so as to meet any need.

This is particularly so in regard to "The Laws of the Election of Members to the Parliament," because the qualifications of members and many details connected with the election must be modified from time to time so as to meet the future requirements of the progress of people and the change of national conditions; as was done in 1900 when the law was modified to meet the requirements in regard to the qualifications of electors and candidates.

The Japanese Constitution is divided into seven chapters, comprehending 76 articles:

Chapter I relates to the Emperor; Chapter II to the Rights and Duties of the Subjects; Chapter III to the Imperial Parliament; Chapter IV to the Minister of State and Privy Council; Chapter V to the Judicature; Chapter VI to the Finances; Chapter VII to the Supplementary Rules.

Chapter I relates to the imperial sovereignty. The present emperor of Japan is the direct descendant of the first Emperor Gimmu, who, after having conquered all the tribes, became the sole ruler of the nation in the year 660 B.C. During a period of more than 25 centuries, one unbroken line of emperors has succeeded to the imperial power, a unique exception in the history of monarchies. This fact was strongly emphasized in Article I by stating that "the Empire of Japan shall be reigned over and governed by a line of emperors unbroken for ages eternal."

Under this chapter the royal prerogatives are summarized as concisely as possible in a few articles, yet conceding all the ancient rights and powers of the emperor which had been so long in the hands of the Japanese sovereign. In regard to the royal prerogative, European

countries have enumerated in their constitutions all the rights and powers of the sovereign so fully that they have greatly handicapped the royal will; but the emperor of Japan, so long as he does not interfere with the Constitution, can exercise his ancient right to the full. According to the Constitution, the three powers of state, the Legislative, Executive and Judicial, are invested in the person of the emperor, who is the life and centre of the whole political mechanism. Japan, by the method she pursues in connection with her sovereign, gets rid of the idea once prevalent in the 18th century, that legislative, executive and judicial powers should be independent of one another.

Chapter II deals with the rights and duties of the Japanese subjects in conformity with European system. When feudalism held sway in Japan, the people were divided into four distinct classes: the military, the farming, the artisan and the merchant. Civil and political rights were enjoyed only by the military, but at the imperial restoration, in 1868, class distinction in politics was abolished; and by the new Constitution civil preference has likewise been put aside. Each Japanese subject, therefore, in his political and civil rights, is now on an equal footing with his neighbor. Moreover, he has acquired the freedom of speech and writing together with that of publication, and the privilege of holding and attending public meetings and forming associations; liberty to choose a place of residence; and, finally, he is granted the freedom of religious belief and worship. Nor can a Japanese be arrested, detained, tried or punished except according to law; nor can a dwelling be entered or searched without a magistrate's warrant. The right of property and the privacy of correspondence are considered inviolable except by a provision of law. Each subject has an equal eligibility for civil or military appointments, and for any other public office; and no preference is given to family or order. The right of petition, which in an early period of their constitutionalism was so much sought after by the Anglo-Saxons, and won at last after fierce opposition, was granted to Japanese subjects as a free gift of the emperor.

In Chapter III the organization of Parliament is divided into, first, the House of Peers, and, second, the House of Representatives. The organization of the two Houses is not mentioned in the Constitution, but is left to ordinary laws, in order to meet the requirements of time, and to be modified accordingly. Qualification and the electorate, too, must vary with social and political progress; but the Constitution itself cannot be changed like ordinary laws.

The parliamentary organization greatly resembles that of England, but its power is more limited. If we compare the Japanese Parliament with that of England and with the Congress of the United States, we see a greater resemblance to the American Congress than to the English Parliament; for the latter has almost the sole right of sovereignty and can well-nigh act as it pleases, and even change the Constitution itself; while the former must obey the provisions of the Constitution, and can do nothing outside of the power already sanctioned thereby. There is, however, a striking difference between the Japanese and the American constitutions, for in the United States the Constitution proceeds from the people; in Japan from the emperor. Therefore the Japanese Parliament may be styled a non-sovereign, legistro-financial assembly, for it is convened by the emperor to deliberate upon questions of law and the national budget. If we compare the constitutions of three countries, namely, England, the United States and Japan, we have a marked dissimilarity: in England the sovereign power rests with Parliament; in the United States with the people; and in Japan with the emperor. Here we have an excellent specimen of three constitutional forms of government. The first we may call a constitutional parliamentary government, the second a constitutional democracy and the third a constitutional monarchy.

The Japanese Parliament has many powers, which are enumerated in the Constitution, but if we take the more important ones, they are four in number. The first is to deliberate upon and discuss points of law brought either by the government or by its own members; the second, to examine and vote upon the national budget; the third, to receive petitions from the people, and to question the government upon any matter relating thereto; and the fourth, to present an address to the emperor upon grave questions of national affairs, or to report to him upon the condition of ministerial confidence.

Chapter IV relates to the ministers of state and privy councillors. There is, possibly, no question of constitutional law further from solution than that dealing with the responsibility of ministers — and to what extent their responsibility reaches, and to whom the ministers are really responsible.

In almost every country governed by a constitution it is acknowledged by custom or usage that the ministers are responsible to the Parliament for the management of national affairs, and by this means the Parliament has already gained the whole power of sovereignty, or is endeavoring to gain it at the expense of ministerial stability.

From this article we infer that the Japanese ministers are responsible only to the emperor — not to the Parliament — for the management of national affairs; and ministerial responsibility arises simply from the advice they have given to their sovereign as councillors. But when we examine their position toward the Parliament from a practical point of view, we find the ministers with a twofold responsibility,—one, direct, to the emperor, and the other, indirect, to the Parliament. Notwithstanding the fact that the ministers of state are appointed by the sovereign personally, and their official position is entirely dependent upon the royal pleasure, Parliament, by means of an address to the emperor, controls the conduct of ministers in regard to national policies. This indirect responsibility comes from the position of the ministers toward the Parliament in relation to questions of law and the national budget.

The Privy Council is the supreme deliberative body attached to the sovereign, whom it advises whenever it is consulted upon important questions of national policy. Its function is, first, to decide disputes arising from the interpretation of the Constitution, or the quasi-constitutional laws, such as the Law of the Houses, the Election Law, the Law of Finance, and the like, or disputes in regard to the budget

or other financial measures; and, second, to deliberate upon amendments to the Constitution, or amendments to the quasi-constitutional laws. Thus the Constitution creates the two media in the system of government through which the national affairs are managed: the one, the ministers of state, who guide the national policy and transact all the administrations of government; and the other, the Privy Council, which advises the sovereign whenever he consults with that body.

We now come to Chapter V. According to the system which prevailed in Japan during the time of feudalism, the Department of Justice was under the control of the state, and judges were dependent upon the Minister of Justice. But as the influence of the military class under the feudal system increased, all the political powers passed into their hands, and consequently judicial power was under the guidance of the chief of police, and so continued till the time of the imperial restoration in 1868. Immediately after, however, the judicial authority was centred in the emperor. Thus the Japanese fully recognized the legal maxim that the sovereign is the fountain of justice, and that all judgments should be pronounced in his name; and this recognition is clearly stated in Article 57 of the Constitution, which says that "the judicature shall be exercised by the courts of law, according to law in the name of the Emperor."

The judicial organization of Japan is much the same as that of the Western nations, for the court is divided into the following classes, namely: first, the District Court; second, the Provincial Court; third, the Court of Appeals; and fourth, the Court of Cassation. The judges are appointed by the emperor; but he can select only those who possess the proper qualifications according to the provisions of law. In order that a trial may be conducted with justice and impartiality, the judges are appointed for life, independent of dismissal either by the emperor or by the Parliament, and they can be discharged from their office only by a sentence passed by the criminal court, or upon the disciplinary trial, whose rules and proceedings are to be decided by law.

Chapter VI deals with finance. The Constitution attaches great importance to financial affairs, for it has made many improvements on European systems which have been the result of the keen observation of the most practical financiers. For instance, the national budget is first presented to the House of Representatives in a form similar to that of most constitutional countries in Europe; but the House of Peers has the same right to examine it and vote upon it as the Lower House; and by these means, while giving the Upper House more power than a mere adoption or rejection of the budget *in banc*, it restricts the absolute power of the House of Representatives over the annual budget. In this respect, the Japanese Constitution more resembles that of the United States than that of Great Britain. A careful investigation of the English parliamentary control over the national budget has shown that there was a time when that Constitution allowed the same right to the House of Lords as to the House of Commons; but in the course of years the latter gradually gained a full sway over the question of national finance. Yet since the peers pay as heavy taxes to the treasury as the commons, they should not be deprived of the right to vote on this question. This is one of those anomalies of the English Constitution which can be explained only by its peculiar history and tradition. Therefore it is unnecessary to follow the example of Great Britain in a new country like Japan, as she has her peculiar history and a different condition of national finance.

Another instance of divergence is that of the expenditure, which, according to the Constitution, is divided into two classes, the immovable and the movable. In regard to the immovable, Article 67 states that "those already fixed expenditures, based by the Constitution upon the powers appertaining to the emperor, and such expenditures as may have arisen by the effect of law, or that appertain to the legal obligations of the government, shall be neither rejected or reduced by the Imperial Parliament without the concurrence of the government." Under this head are included the civil list, ordinary expenses required by the organization of different branches of the administration, and by that of the army and navy, the salaries of all civil and military officers, and outlays that may be required in consequence of treaties concluded with foreign nations; the expense of the House of Parliament, annual and other miscellaneous allowances to the members, government pensions and annuities, the interest on the national debt, redemption of the same, and other outlays of a like nature. These expenditures are fixed by the Constitution, which, being the highest and the fundamental law of the country, cannot be changed by any process of ordinary legislation. Thus all those expenditures which are necessary for the existence and continuance of the national government are secure from reduction or rejection by either House. This provision may be compared with those regulations relating to the English Consolidated Fund; and a similar protective clause has recently been made in several German states, namely, Brunswick, Oldenberg, Hanover and Saxe-Meiningen.

The movable expenditures, consisting of all those items exclusive of the immovable expenditures which are either casual or temporary in their nature, are annually brought before the Parliament for discussion and approval.

Our last chapter is devoted to the supplementary rules, and has special reference to the amendment of the Constitution, which can be made only by the emperor.

By the adoption of the constitutional government, Japan has shown to the whole world that she is following in the steps of the civilized nations, and the record of the last 18 years of her Parliament has shown to Europe and America that Japan has mastered the most intricate mechanism of constitutional government. And again by adopting the constitutional government, Japan not only entered into the family of civilized nations, but has shown to the world that the constitutional government is not monopolized by the Caucasian race. Moreover, Japan by her earnest study of 19th century science, by her keen appreciation of the fruit of civilization, and by her strong perception of national responsibility has entered into the arena of constitutional government and mastered thoroughly the same principle ac-

knowledged in the civilized nations of Europe and America.

VISCOUNT KENTARO KANEKO,
Privy Councillor, Tokio.

8. FOREIGN RELATIONS. The first foreign relations of Japan were, as might be expected from the geographical position of the islands, with the peninsula of Korea. The dividing strait with the islands of Iki and Tsushima situated, like stepping stones, at convenient distances, cannot have been very difficult to cross even in primitive boats. We accordingly notice that there existed from the earliest times close relations between these two countries, and in the beginning of the Christian era Japan was exercising a sort of protection over the kingdom of Nimana. The kings of Silla, on the other hand, had so much influence over the tribes in the south of Japan as to instigate them to revolt against the central government. Continuous troubles caused by them induced the Empress Jingo to set out on an expedition to Korea. This invasion, however, was so unexpected that when the Japanese army landed on the coast of Silla, 200 A.D., the king asked for peace without offering the least resistance. The kings of Kulei and Paikchyoi soon followed his example, and the three kingdoms of Korea became vassal states of Japan. They promised to pay annual tributes and the Japanese resident at Nimana was entrusted with their supervision. They, however, very often failed to keep their promise, and had to be as often chastised. They, moreover, waged frequent wars against one another, and Japan had always to interfere in the interest of the weaker state. Many residents, too, taking advantage of the great distance from home, attempted to make themselves independent, and armies had to be sent to punish them. Thus the dominion over Korea was the cause of endless trouble to Japan.

In 562 Silla conquered Nimana and did away with the Japanese government which had existed there for about five centuries. Silla grew further in power, and allying herself with the new risen Tang rulers of China conquered Paikchyoi in 662, and Kulei in 668. Japan's attempt to check the progress of the allies was of no avail and her influence in the peninsula came to an end.

The intercourse with Korea, however, was not wholly stopped. Silla sent embassies, although with frequent interruptions and often in hostile attitude, and when the new kingdom of Pohai arose in the 8th century, her embassies came very often, so that there used to be interpreters for their language in Echizen, and those for that of Silla in Tsushima. When in the 10th century Silla was overthrown and the later kingdom of Kulei arose, the official relations with Japan were stopped, but commerce went on as before.

The intercourse with Korea was highly beneficial to Japan. Korean weavers, embroiderers, potters, blacksmiths, shipwrights and other artisans were encouraged to establish their industries in Japan. Physicians, astronomers and painters were also invited. The study of Chinese literature was introduced by two Korean scholars, Achiki and Wani, in the latter part of the 3d century and thus the way was opened for the adoption of Chinese characters. In 552 the king of Paikchyoi presented to the emperor of Japan an image of Buddha and a a copy of the sutras. Notwithstanding the strong opposition on the part of many influential adherents of the national worship, Buddhism gained ground steadily. In the train of the new religion came priests, temple architects, sculptors, painters, musicians, etc. These, together with Korean emigrants, who settled in large numbers in different parts of Japan, helped to give a great impulse to the progress of arts and industries.

The Japanese seem to have come into contact with the Chinese for the first time in Korea, where numbers took refuge from the terrors of constant wars in their own country. Later on, some of these, like the Hadas and the Ayas, settled with all their families in Japan.

In those times merchants from different parts of Japan were accustomed to go to China via Korea. In the beginning of the 4th century the court sent an envoy to Wu with the object of engaging weavers. Afterward embassies were sent from time to time during the rule of the Sui and the Tang dynasties, the first embassy to the court of Sui leaving Japan in 606. These embassies were accompanied by a large number of priests and students. These latter came back after a stay of some years full of new ideas. They helped to reorganize the government and make new laws and introduced improvements in social organizations. They gave a new stimulus to the study of the Chinese classics and thus prepared the way for the growth of the national literature. Two forms of syllabics — *kata-kana* and *hira-kana* — were both their inventions. They brought back with them such useful plants as tea, cotton and the orange, and also helped to bring about the progress of arts and industries. In short, they played a very important part in introducing the Chinese civilization.

These embassies had to be stopped at the end of the 9th century, when the power of the Tang emperors became very weak and China was plunged in a frightful state of wars. They were not renewed when the Sui dynasty began to reign, but Japanese priests still continued to visit China, and commerce was even more active than before. The Japanese authorities encouraged the coming of Chinese vessels by opening new ports in the interior, and conferring special honors upon Chinese merchants.

When the Mongol-Tartars overthrew the Sung emperors, and the new dynasty of Yuen began to reign, the great emperor, Kublai Khan, conceived the idea of annexing Japan, and sent in 1268 an envoy demanding immediate submission. This and other embassies were sent back without any reply. The Khan, enraged at this slight, sent a fleet of 450 vessels against the island empire. In 1274 the fleet proceeded to the western coast of Kyushu, after ravaging the islands of Tsushima and Iki. The Japanese army made a stout defense and kept the enemy from landing for more than a month, when a violent storm destroyed many of the invading vessels and the remnant sailed away secretly by night. This disaster only helped to enrage the Khan still more, and when his envoys were put to death in 1279 by the order of Hojo-Tokimune, he fitted out a large fleet of 4,000 vessels with 100,000 soldiers and 10,000 Korean contingents. All this time Japan was

not idle. The western coast of Kiushu was strongly fortified, and soldiers flocked there from all parts of Japan to defend their country. The immense fleet came in 1281, and began to attack the forts at once. The Japanese suffered very much from the enemy's guns, but they were able to prevent the landing of the enemy for more than two months. The number, however, might have finally told, when for the second time the elements came to Japan's help. On the 16th of August, 1281, a typhoon attacked the coast and shattered the whole fleet of the Mongols; a few thousand survivors took refuge on the small island of Takashima, but were either killed or taken prisoners. It is said that out of the whole army only three were able to escape alive. Such was the end of the grand fleet of the mighty Khan. Japan might well be proud of her stout resistance, and rejoice over her miraculous deliverance.

After this defeat Yuen emperors relinquished forever the conquest of Japan and even became friendly. Commercial relations were re-established and in the middle of the 14th century we find semi-official Japanese vessels going annually to China—the so-called Tenryuji vessels, the proceeds of whose commerce were to be used for the benefit of the temple.

At the end of the 14th century, Choo-Yuen-Chang, the founder of the Ming dynasty, after expelling the Mongol invaders, sent an embassy to demand that Japan acknowledge China's sovereignty, but the Japanese government angrily refused to do so. The Chinese emperor, however, thought better of it, and made it a policy of his house never to attempt the conquest of the islands. In the 15th century the Ashikaga shoguns sent frequent embassies to the court of the Ming sovereigns, and commerce was very flourishing. Hakata, Hyogo and Sakai were the chief ports of foreign trade. The most important articles of import were textile fabrics, dye-stuffs and drugs. Copper coins were brought in large quantities, as Japan did not yet coin her own money.

During the troublesome times which followed the decline of the power of the Yuen dynasty many lost their livings in China and turned pirates. Many Japanese adventurers joined the bands of pirates and plundered the coast towns of China. Their junks were known as "Bahan" vessels and were held in fear all along the coast. The government was incapable of suppressing them. To exercise closer supervision over the pirates, the Ming government sent passports to be given by the Japanese government to merchants going to China. Japan's relations with China continued in this state till the time of Hideyoshi.

At the end of the 16th century Hideyoshi, having brought into subjection all the princes of Japan, and put an end to internal disturbances, conceived the idea of conquering foreign countries. This was a skilful stroke of policy on his part as the newly subjugated princes would forget their own dissatisfaction in the glory of the nation. From his unprecedented successes he also seems to have come to believe in his mission of grand conquests. In 1590 he sent an envoy to Korea to demand her to recognize Japan's suzerainty and also to tell China to do the same. As Korea refused to do either he made immediate preparations to invade the peninsula. In April 1592 a land force of 130,000 soldiers and a fleet manned with 9,000 sailors left from Kyushu. The army landed at Fusan, and was everywhere victorious. The capital was taken, the king fled and two young princes of the royal blood were taken prisoners. Two Chinese armies sent in succor were defeated one after another. These signal defeats induced China to sue for peace. After some negotiations seven articles of peace were agreed upon, and a truce was concluded, the greater part of the Japanese army withdrawing from Korea. In these articles Hideyoshi demanded among other things the cession of one-half of Korea, and as pledges for peace in future, the marriage of a Chinese princess with a Japanese prince of the imperial blood, as also the giving in hostage of the Korean Prince Royal. The Chinese emperor did not ratify these terms, but thought Hideyoshi could be appeased by making him king of Japan. When in 1596 an envoy came to Japan with the imperial patent to that effect, and its purport was made known to Hideyoshi, the latter became so enraged as to throw the document on the ground and summarily dismiss the envoy. Renewal of the war was at once declared and in February of the following year the Japanese forces again left for Korea. The second campaign was not very successful at the outset. The Japanese suffered great losses from the combined Chinese and Korean armies. When they began to gain advantages and assert their superiority over the enemy the death of Hideyoshi (13 Sept. 1598) led to the recall of the army.

Iyeyasu, who was intent on promoting the material prosperity of Japan, wished to cultivate friendly relations with China and Korea, and tried to remove the feeling of enmity by restoring the captives of war. In 1606 Korea sent an embassy and renewed her commerce with Tsushima, but China repulsed the advances of Iyeyasu, and forbade her subjects to trade with Japan. Notwithstanding this, all through the Tokugawa period Chinese merchants came in large numbers to the port of Nagasaki.

Japan was brought to the notice of Europeans for the first time by Marco Polo. His description of Zipangu, immensely rich in gold, made a deep impression on the minds of Europeans, and it is a well-known fact that Columbus had the discovery of the island in view when he set out on his westward voyage. It was, however, in 1542 that the Europeans first reached Japan. In that year three Portuguese adventurers, Antonio da Mota, Francisco Zeimoto and Antonio Pexoto by name, met a violent storm on their way from Siam to Ningpo, and after drifting for some days on the broad sea arrived at the islands in the south of Japan.* According to a trustworthy Japanese account† the first arrival of Europeans was

* Antonio Galvão, 'Tratado dos descobrimentos antigos e modernos,' etc. Lisbon, 1563.

† An essay on the introduction of fire-arms by Nampo, a learned priest of Kagoshima, who flourished at the beginning of the 16th century. Fernão Mendez Pinto's claim to the discovery of Japan has misled many writers. A manuscript history of the Church of Japan, up to 1634, compiled by Jesuit Fathers residing in Japan at the time, now in the Ajuda Library at Lisbon, refute Pinto's claim, and describes the book as "written more for amusing one than for telling the truth."

at Tanegashima off the coast of Satsuma in 1543. But the "big ship with a crew of more than one hundred men of strange forms and unintelligible language" seems to have been other than the junk of the three adventurers. This ship seems to have come after the discovery was made known by the adventurers. The Portuguese commerce once opened grew in importance very rapidly. Already in 1546, we find no less than three Portuguese vessels trading in the ports of Satsuma at the same time.

The Jesuit missionaries helped to bring about further growth of commerce. In 1547 a certain Yajiro of Kagoshima,* who having committed a homicide took refuge in a temple and became a bonze, was taken to Malacca in a Portuguese vessel. There he met Francis Xavier, who was one of the first members of the new order of Jesuits, founded in 1540, and had been engaged since 1542 in the conversion of the East. Following Xavier's advice, Yajiro went to Goa and entered the Jesuit College of Saint Paul, March 1548. He was baptized a short time afterward, and was henceforth known as Paul of the Holy Faith. In 1549 Xavier left India taking with him Paul and his two servants, and two Jesuits — Father Cosmo de Torres and Brother Juan Fernandez, — and arrived at Kagoshima on the 15th of August of the same year. After preaching about a year in Satsuma, Xavier was obliged to leave on account of the violent opposition of the Buddhist priests. He went to Hirado — Firando, as the Europeans used to call it — and thence to Yamaguchi. Xavier also visited Mikado, the capital, but, finding it in a state of great confusion consequent to the wars, he gave up the idea of preaching there and returned to Yamaguchi. In November 1551 he left for India from the port of Hiji in Bungo. His stay in Japan was a little over two years and he made only about 700 converts, but he conceived such a good opinion of the convertibility of the people, that he wrote to Rome strongly recommending the sending of more members of the order. In order to facilitate the voyage, he proposed that the viceroy of India or some rich merchants should be induced to send regularly trading vessels laden with pepper and European goods, which would sell very profitably. He urged that they must catch "every one by his own bait." Xavier's suggestions were acted upon. Beginning with three in 1552, Jesuit missionaries were sent from time to time, and encouragement of the Japanese trade resulted in its rapid growth.

The Portuguese vessels first visited the ports of Satsuma and Bungo. Xavier induced these vessels to come to Hirado when he was ordered to leave Satsuma, and so long as Christianity was favored the port remained a flourishing centre of foreign trade. As, however, the Prince of Hirado acceded to the demand of the Buddhist priests and became unfriendly to the missionaries, the Portuguese captains began to visit other ports after 1562. In 1570 they entered the port of Nagasaki for the first time, and as the harbor was very convenient and the Prince friendly to the Christians it was made the port for Portuguese commerce. A few years later the Prince of Omura presented Nagasaki to the Church. The Jesuits made it the headquarters of their mission, and many churches and convents were built. The Portuguese settled there in large numbers, and Japanese merchants flocked from all parts of the country. Nagasaki, which was a small fishing village, soon became a very flourishing commercial town. After the conquest of Kyushu, Hideyoshi confiscated the territory and appointed a Bugyo to look after the government of this important town. At that time there were 23 streets and the hills had to be cut and the sea filled up, to make room for enlarging the city.

In 1557 the Portuguese were allowed by the Chinese authorities to establish a commercial settlement in Macao. The Portuguese trade with Japan was carried on from that port and the ships, leaving it in the end of June or early in July, reached Nagasaki usually in about 20 days. In leaving Japan they had to sail by the north-east monsoon, which continued to blow from October to March, so that although these ships used to sail in October, they had to stay in port for two or three months. This was the busiest season there. The chief articles of import were raw silk, cotton goods, silk and woolen stuffs from Europe, India and China, leather and glass wares of Europe, and spices of the Southern Islands. In return, the Portuguese merchants carried gold, silver and iron, rice, flour, ham and dried fish; lacquer wares, screens and arms were also exported. The trade was very lucrative and Macao owed its prosperity almost entirely to Japanese commerce.

In the meantime, missionaries were making steady progress. Many princes of Kyushu embraced Christianity and under the patronage of Nobunaga, Christianity got strong foothold in central Japan. In 1582 the Christian Princes of Bungo, Arima and Omura at the suggestion of Father Valignani sent an embassy to Spain and Rome. Before this the Prince of Bungo sent an envoy to the viceroy of India in the vessel by which Xavier returned to Goa, and afterward courtesies were exchanged between them The Prince of Hirado also entered into communication with the Viceroy. But this was the first embassy to Europe. The embassy consisted of two young men of about 16 years of age, relatives of the Princes, and two Samurais, a little older, with some Japanese and foreign Jesuits. They left Nagasaki in February 1582, and stopping on the way at Macao and Goa, arrived at Lisbon in August 1584. Thence the embassy went to Madrid and were received in audience by Philip II November 1584. They then crossed the Mediterranean from Alicante to Leghorn and went to Rome via Pisa and Florence. On 23 March 1585, they made a public entry into the city and were received in a public consistory by Gregory XIII. The Pope died shortly after, so that the embassy had to wait for the dispatches till Sixtus V was elected Pope. They left Rome in the beginning of June, and after visiting Bologna, Ferrara, Venice, Mantova, Milan and Genoa, where they were very cordially received by the princes and the doges, crossed the sea to Barcelona and thence went through Spain and Portugal to Lis-

* The history of the Church of Japan points out that the name Angero, which appears in most European books, is a corrupted form of Yajiro, who as a bonze adopted the name of Ansei.

bon. They set sail from the latter port in April 1586, and arrived at Nagasaki in July 1590.*

In Europe the embassy was a great success; the work of the Jesuits in Japan was highly appreciated and among other things they got the exclusive right of evangelizing the country. But on arriving in Japan they were greatly disappointed. The Prince of Bungo was already dead, and his successor was neither so powerful nor so zealous for the interest of Christianity. The Prince of Omura was also dead. Father Valignani, who accompanied the embassy from Goa as the viceroy's ambassador, was granted an audience by Hideyoshi, but with the express condition that there would be no talk on religion and in his answer to the viceroy Hideyoshi stated his reasons for expelling the Jesuits and prohibiting Christianity. The edict, however, was not strictly enforced. In 1592 there were altogether 125 Jesuits — 40 fathers and 85 brothers — and 166 native catechists in 20 houses and residences, one college and one seminary. The number of the Christians steadily increased by the combined efforts of these workers.

By this time there were many missionaries well versed in the Japanese language. Many of these devoted themselves to the translation of religious works. As Valignani brought a quantity of European type with him many of these, like 'Doutrina Cristã' (Amakusa 1592), 'Contemptus Mundi' (Amakusa 1596), etc., were printed in Romanized Japanese. They also printed 'Dictionarium Latino-Lusitanicum ac Japonicum' (Amakusa 1595), 'Vocabolario da Lingoa de Japão' (Nagasaki 1603), and 'Arte da Lingoa de Japão,' by Father João Rodriguez (Nagasaki 1604). All these rendered great service to foreign preachers. Many religious works were also published in Japanese which must be given further facilities to the mission work.

In the 16th century the Philippine Islands were frequented by Japanese pirates, of whom mention has already been made. In 1574, only four years after Legaspi took possession of the city, a Japanese corsair attacked Manila at the head of 600 men and was about to take it, when relief arrived and obliged him to retire. Being re-enforced by the pirate Limahon, to whose famous band he belonged, the corsair returned to the attack some days later, but was again repulsed, and finally left the islands. In 1581 another band of Japanese pirates was driven out of Cagayan after a bloody fight with the Spaniards. But it was in 1584 that we first find mention of the coming of the Spaniards to Japan. In August of that year a ship from Manila bound for Macao entered the port of Hirado by the captain's almost incredible ignorance of the seas. The Prince of Hirado seized the opportunity to send a letter to the governor, asking him to send a ship with missionaries every year. The vessel left for Macao in October, and the desire of the Prince was also made known to the Spanish government, but we hear no more of the affair. In the spring of 1592, Hideyoshi sent an envoy to the governor of the Philippine Islands demanding of him that he recognize the sovereignty of Japan, and threatening him with an invasion in case he hesitated to do so at once. The embassy with Harada-Magosichiro at its head arrived at Manila 29 May. Magosichiro was well known in the city which he had previously visited as a merchant. At that time the number of the Spanish soldiers in Manila was small and wholly inadequate to defend the place. As it was rumored that the warlike preparations for the invasion of Korea then in progress in Japan were really intended for the islands, the Philippine government thought it better to dissimulate and gain time. Pretending that the low birth of the envoy made the embassy suspicious, and that they could not understand the letter as there was no one to interpret it,* the governor, Gomez Perez das Mariñas, sent Fray Juan Cobos with a letter and some presents to Hideyoshi. At the same time he wrote urgent letters to Mexico and Spain informing the king and the viceroy of the situation, and asking for an immediate re-enforcement. Father Cobos arrived in safety at Nagasaki, and saw Hideyoshi at his headquarters at Nagoya in the province of Hizen. He left with a letter of Hideyoshi confirming the first, but his ship was wrecked off Formosa, and only the ship of the second Japanese envoy, *Harada-Kiyemon*, reached Manila in the end of May 1593. Making the loss of Hideyoshi's letter another pretext the governor sent a second embassy. Fray Pedro Baptista saw Hideyoshi at Nagoya and sent his answer to Manila by one of his suite, he himself remaining as hostage with other Franciscans of the embassy. A council of chief officials at Manila which met on receiving this letter, 24 April 1594, was of the opinion that a downright refusal to submit would only serve to irritate Hideyoshi and precipitate his invasion, and decided to send a letter expressing their willingness to continue friendly relations with Japan and promising to answer more particularly on receiving instructions from Madrid. By this time Hideyoshi must have become aware of the duplicity of the Philippine government, but he was then so deeply engaged in the Korean war that the idea of invading the islands, if he ever really entertained it, had to be given up for the moment. In 1596 a richly laden Spanish galleon called *San Felipe* encountered a violent storm on her way from Cavite to Acapulco and took refuge in a port of Tosa. Hideyoshi declared the ship forfeited with all its goods. It is said that the captain, wishing to impress the Japanese with the greatness of Spain, pointed out on a map of the world all the Spanish possessions, and when asked how all those territories were obtained, explained that it was by sending missionaries first, and then soldiers to co-operate with the converts in subduing them. This alarmed the authorities, confirming them in the suspicions they already entertained. Hideyoshi immediately ordered Father Baptista with five Franciscans and 20 Japanese Christians to be put to death on the charge of having preached Christianity con-

* Many documents relating to this embassy, among which are some letters of the ambassadors in Japanese, are still extant in the Vatican archives, and the State archives of Rome, Florence, Venice, Mantova, Modena, Milan and Genoa. The more interesting of these have been published: Berchet, G. 'Le antiche ambasciate Giapponesi in Italia,' (Venice 1877), and Boncompagni Ludovisi, 'Le prime due ambasciate dei Giapponesi a Roma' (Rome 1904).

* A Spanish translation of the letter still preserved in the Archivo de Indias, at Seville, proves that this was a mere pretext. The translation, probably made by some Chinese, almost exactly corresponds with a Japanese draft in existence. Many other documents relating to this affair are preserved in the same archives.

trary to his edict. The new governor, Don Francisco Tello, demanded restitution of the forfeited goods and satisfaction for the execution of the ambassador and his suite 1597. Hideyoshi answered by simply stating that a ship wrecked on the Japanese coast belonged by right to him, and that the priests were executed because they disregarded the laws of the country and were laying plans to get possession of Japan. Don Francisco did not make any further protest. The commerce with Japan to which the Spanish settlement owed its supply of provisions, iron, nails and other material for shipbuilding, was so important that the Philippine government was ready to overlook any slight rather than lose it.

When Iyeyasu succeeded to the government he adopted an entirely different attitude toward the islands, as he did toward Korea. He asked a Franciscan father in Japan to communicate to the governor his desire to maintain friendly relations with the islands. In 1602 he sent an envoy to Manila and the governor, Don Pedro de Acuña, cordially responded. In compliance with the request of Iyeyasu he sent to the port of Uraga, a small vessel, which failed to reach that port, but a few years later Spanish ships began to call at Uraga regularly. Iyeyasu also wished to establish commercial relations with Mexico. He repeatedly asked the governor to make his desire known to the viceroy. When in 1609 the galleon *San Francisco* was wrecked on the coast of Kazusa and Don Rodrigo de Vivero, ex-governor of the Philippine Islands, who was one of the passengers, visited Iyeyasu, he mentioned his desire, Don Rodrigo, seeing an opportunity for the Christianization of the land and the expulsion of the Dutch who had established a factory at Hirado, promised to use his influence to bring about the desired relations and consented to make the voyage to Mexico in a Japanese ship. The ship registered 120 tons, and had been built some years before by William Adams, an English pilot who had been in Japan since 1600. Fray Alonzo Muñoz, a Franciscan father, left in the same vessel with the letters of Iyeyasu to the king of Spain and his minister, the Duke of Lerma. The *San Buenaventura* set sail from Uraga in August 1610, and reached Matanchel in October. This was the first Japanese ship to cross the Pacific Ocean.

In April 1600, a Dutch ship caller the *Liefde* arrived at Bungo. It was one of the five ships that left Texel, June 1598, with the intention of reaching the Molucca Islands by way of the Strait of Magellan. The crew, of whom only 18 survived, remained in Japan. In 1605 the captain, Jacob Quackrnack, sailed from Hirado in a junk of the Prince with a letter of Iyeyasu and a passport for the Dutch vessels that would come to Japan. In 1608 the directors of the Dutch East India Company, hearing that a truce for 12 years was about to be concluded between Holland and Spain on the basis of maintaining the status quo, sent a dispatch boat to the commander of the fleet in the East instructing him to make treaties with as many native princes of the East as possible, and especially with Japan. Admiral Verhoeven accordingly ordered two ships, the *Roode Leeuw met Pijlen* and the *Griffoen*, to Japan. They arrived at Hirado, 2 July 1609, established a factory there and left 3 October, with a letter to the Stadtholder and some passports from Iyeyasu. After the arrival of the *Liefde* the Portuguese and the Spaniards tried every means to induce the government to send the Dutch out of Japan, but Iyeyasu in pursuance of his policy of encouraging foreign commerce, steadily refused to take such a step.

When Don Rodrigo arrived at Mexico an expedition was about to leave for the discovery of the Isles of Gold and Silver, which were said to be situated near Japan. It was decided that Sebastian Vizcaino should go first to Japan and thank the government for the courtesies shown to Don Rodrigo and thence set out on the voyage of discovery. Vizcaino left Acapulco, 22 March 1611, taking with him the Japanese merchants who accompanied Don Rodrigo, and arrived at Uraga, 10 June 1611. He was received by the Shogun and Iyeyasu with great ceremony. With permission of the government he sounded the eastern coast of Japan and then set out from Uraga, 16 Sept. 1612, on the voyage of discovery. After sailing about for many days in the hopeless search for the Gold and Silver Isles the ship suffered so much from the storms that Vizcaino was obliged to enter Uraga again, 7 November. This time he encountered a reception quite different from the first. The enemies of the Spaniards insinuated that the soundings of the coast were made with a view to the coming invasion and Vizcaino's silence about the Isles of Gold and Silver was also commented upon as a treacherous act. These added to the dislike the authorities had entertained of the overbearing attitude of Vizcaino. Vizcaino was baffled in all his attempts to get a vessel to take him back to Mexico. He was obliged to accept the proposal of Date-Masamune, a powerful prince in the north of Japan, to take passage in his ship. The ship was to carry an embassy of Masamune to the king of Spain and the Pope, with the object of asking them to send Franciscans to teach Christianity in his dominion, for whose voyage Masamune offered to send ships to Mexico every year. The moving spirit of the embassy was Fray Luis Sotelo, who wished to open a field of action for his order. With the same object he had promoted the embassy of 1610, but there was no news of Father Muñoz. He grew impatient and determined to go himself. He was aware of the desire of Masamune to open commerce with Mexico. He saw his opportunity in the embarrassment of Vizcaino, and persuaded Masamune to send Vizcaino and his crew to Mexico in his ship. He himself undertook to go with Hasekura-Rokuemon, a retainer of Masamune, to make a commercial treaty with the court of Spain. The ship set sail from the port of Tsukinoura, 28 Oct. 1613, and arrived at Acapulco, 25 Jan. 1614. Thence the embassy proceeded to Mexico and embarking from Vera Cruz, 10 June, entered the port of San Lucar on the 5th of October. They were magnificently entertained in Seville, where they took a letter of Masamune* with his presents. The embassy pro-

* The letters of Masamune to the city of Seville and the Pope are still kept in the municipal archives of Seville and the Vatican Library respectively. Correspondences, resolutions, reports and other documents relating to the embassy are abundantly preserved in the municipal archives of Seville and the Archivo de Indias. Documents from the Vatican and the state archives of Venice and Genoa have been published in the words of Berchet and Boncompagni-Ludovisi already referred to. These documents, together with all other materials concerning the embassy are given in the "Dai Nippon Shiryo," Part XII, Vol. XII.

ceeded to Madrid, and had an audience of the king, 30 Jan. 1615. Taking passage from Barcelona in a ship bound for Genoa the embassy arrived at Rome, 25 Oct. 1615. Pope Paul V, who was impatiently waiting for the arrival of this second embassy from Japan, received them with great honors. He recommended the king of Spain to accede to the desire of Masamune and nominated Sotelo bishop of the northeastern part of Japan. Hasekura was made a noble, and the Samurais of his suite citizens of Rome. The embassy left Rome, 7 Jan. 1616, visited the Grand Duke of Tuscany on their way, and retraced their steps from Genoa to Seville. Considering the religious zeal of the king of Spain, this embassy was expected to accomplish its object easily, but it was doomed to share the same fate as that of Father Muñoz. Muñoz arrived at Madrid at the end of 1611, but his mission proved a failure. Fray Diego de Santa Catalina was sent after long delay as envoy and taking passage from Acapulco in the ship of Masamune, arrived at Uraga, August 1615, but as the letter of Phillip III said nothing about the commerce, the government refused to accept the presents, and dismissed Fray Diego in disgrace. In default of any other vessel Fray Diego made another voyage in Masamune's ship, contrary to the orders of the viceroy, and arrived in Mexico, March 1617. The failure of Muñoz's embassy was mainly due to the strong opposition on the part of the merchants of Manila, who desired to monopolize the Japanese trade. In the case of Masamune's embassy, another factor entered. The Jesuits, fearing that its success would secure to the Franciscans the same advantages that the embassy of 1585 brought to themselves, used their powerful influence to bring about its failure. The persecution of 1614 was made use of to discredit the embassy. Neither the recommendations of the Pope and the municipality of Seville nor the utmost efforts on the part of the embassy were of any avail. The embassy had to leave for Mexico in 1617 without having accomplished its mission. In the spring of 1618, they embarked at Acapulco in the ship that had been waiting for them since the previous year and sailed for the Philippine Islands. Hasekura returned to Japan in 1620. Sotelo, who was placed under strict vigilance by the authorities, finally succeeded in evading it and embarked for Japan, 1622. He was easily recognized, thrown into prison and put to death, August 1624.

The attempts to establish a regular trade with Mexico ended in failure. But all this time the foreign commerce of Japan kept steadily growing. In 1612 two Dutch ships arrived at Hirado. These were the first ships sent from Amsterdam after receiving the news of the establishment of a factory in Japan. The Dutch commerce was now regularly established.

In 1613 another competitor entered the field. The East India Company of London, which had long cherished the idea of trading with Japan, at last sent, in April 1611, Capt. John Saris with the express object of establishing a factory in Japan. Captain Saris arrived at Hiado, 11 June 1613, on board the *Clove*. William Adams, whose presence in Japan was known in England, was sent for, and with his help ample privileges were obtained, and a factory was established at Hirado.

After the death of Iyeyasu, 1 June 1616, the Shogun adopted a new policy toward the foreigners. He began with ordering the Dutch and the English to recall their agents at Osaka and Yedo, and to limit their trade to Hirado and Nagasaki. He adopted more severe measures toward Christianity, and seeing that the missionaries continued to come from the Philippine Islands against his repeated orders, he prohibited the visits of Spanish vessels in 1624. An embassy, which came from Manila in 1623, for promoting friendly relations, was sent back in that year with orders to come no more.

The English and the Dutch, confined to the small market of Hirado, began a sharp competition between themselves, and even went so far as to fight with each other in the street. The English suffered very much from this competition, and felt themselves greatly relieved when a treaty of defense was made between the two nations, June 1619. A part of the fleet of defense was stationed at Hirado and used to go out against Spanish ships and Chinese vessels trading with Manila, on piratical expeditions. This was the busiest time for the English factory (July 1620–August 1622). Very soon after the fleet was disbanded, the factory was dissolved as unprofitable, and the staff left for Batavia, 24 Dec. 1623. The rejoicing of the Dutch at this event did not last long.

In 1624 the Dutch founded a commercial settlement in Formosa with the consent of China. There they found many Japanese already trading with the Chinese. Formosa, then known as Takasago, seems to have been a favorite rendezvous of Japanese pirate vessels, and since the time of Hideyoshi several attempts had been made to subjugate the island. Such being the case the Japanese vessels that entered the port refused to pay the customs duties levied by the Dutch. Hamada-Yahyoe, captain of a junk, was especially offended at the treatment he received and took to Japan 16 natives of Sinkan as ambassadors sent to offer the sovereignty of the island to the Shogun, 1627. The Shogun received them at the court, and sent them back with presents. Some days before Hamada left Formosa, Pieter Nuyts, governor of Formosa, went to Japan to notify the government of the occupation of Formosa and to negotiate for the prohibition of Japanese junks going to Formosa. But he was not even received by the Shogun, and returned to Formosa greatly offended. When Hamada arrived there with two junks in April 1628, the governor threw the natives of Sinkan into prison and confiscated the Shogun's presents. He then took on shore all the arms in the junks and tried to keep the junks till he had consulted the chief factor of Hirado on the steps to be taken. Hamada called on the governor with some companions and taking him unaware made him prisoner. The Dutch came to the rescue in large numbers but could do nothing lest Nuyts should be killed. After some negotiations Nuyts was released in exchange for five hostages, among whom was his young son. Restitution was made for the damages suffered by the Japanese, and the junks were allowed to leave in company with a Dutch ship which carried five Japanese hostages to be exchanged with the Dutch at Nagasaki. On their arrival the government threw the Dutch hostages and the more

important members of the crew of the Dutch ship into prison, sequestrated the ships at Hirado and put strict watch on the Dutch factory.

Greatly alarmed at this news the governor-general recalled Pieter Nuyts to Batavia and sent an envoy to Japan to explain the Formosa affair, 1629. But the Japanese government remained inexorable and insisted on the surrender of the fort Zeelandia in Formosa. The governer-general decided to make Nuyts the scapegoat. When he arrived in 1632 and was delivered to the government, other prisoners were released, the Dutch trade was restored and the claim to Formosa was given up. Nuyts himself was released in 1636.

After strict measures had been adopted to stop the entrance of missionaries, Japanese priests educated abroad were sent. The government now resorted to a strict supervision upon Japanese junks engaged in foreign trade and the Japanese coming back from abroad, 1633. Finding this still inadequate the government forbade all Japanese junks to go abroad under severe penalty, 1636. This put an end to an active trade with Tonkin, Cochinchina, Cambodia, Siam and most important places of the Malay Peninsula, which had continued to grow since the time of Hideyoshi and with whose sovereigns the Tokugawa government used to carry on correspondence. In many of these places there were considerable Japanese settlements; the Japanese soldiers of fortune sometimes played very important rôles, like Yamada-Nizayemon in Siam.

The Portuguese merchants were shut up in an artificial island, Desima, in the harbor of Nagasaki, 1635, and all the descendants of the Europeans in Nagasaki and Hirado were sent away. In December 1637 the peasants of Arima, who had been long groaning under heavy taxes, rose against their oppressors. The Christians of Amakusa joined them. After some delay the government forces arrived. The Christians defended themselves very bravely in the castle of Hara, some 45,000, women and children inclusive, against 120,000 trained soldiers. The siege lasted for more than three months, but the castle was finally taken by a general assault, 12 April 1638, and most of the besieged were put to death.

This revolt made the government even more suspicious of the Christians, and suspecting that the Portuguese were at the back of the rebels decided to put an end to the Portuguese commerce, which although broken in 1610, when the Prince of Arima attacked the *Madre de Dios* in the harbor of Nagasaki as the captain had refused to appear before the authorities and answer the charge of having murdered some Japanese who visited Macao in 1608 in a junk belonging to the Prince, and the ship was accidentally burned and all the crew perished, was restored in 1611 by Dom Nuno Sotomaior who came as ambassador of the viceroy. Two vessels which arrived in 1639 were sent back with orders never to return under penalty of death, and when in 1640 an embassy came from Macao, the ambassadors with all their suites excepting 13, mostly blacks, were executed and the ship sunk.

In 1647 an attempt at the renewal of the trade was made by Dom Gonçalo Siqueira de Souza, who came to Nagasaki as Ambassador from Portugal to announce its independence from Spain and the accession of John IV to the throne, but it proved a failure. Another attempt was made in 1685, when a junk with 12 Japanese was wrecked off Macao, but the captain of the vessel that took them to Nagasaki was sent back with strict injunctions to return no more.

The relations with Portugal, however, lasted so long that they have left many indelible traces. In the Japanese language there are numerous words of Portuguese origin, some of which are so perfectly naturalized that their foreign origin does not strike one at once. Such are: boro (bolo, cake), kompeito (confeitos, comfits), pan (pão, bread), hiryuzu (filhos, omelette), koppu (copo, glass), botan (botão, button), batteira (bateira, boat), rasha (raxa, cloth), jiban (gibão, undershirt), birodo (veludo, velvet), kappa (capa, cloak), zambo or zabon (zamboa, pompoleon), marmero (marmelo, quince), etc.

When the Portuguese ships were sent away in 1639, the Dutch thought that they had now got the monopoly of the trade, and it was made an occasion of a fête at Batavia. But they were very soon undeceived. In November 1640 they were ordered to demolish the new stone warehouse at Hirado, and the next year they were removed to Nagasaki. They were closely confined in the small island of Desima which they were seldom allowed to leave. There they were allowed to carry on commerce on a limited scale under strict supervision of the authorities. All these measures were taken to prevent the entrance of Christian missionaries. Every conceivable device that might be resorted to by them was carefully provided against. The government succeeded so well that after the execution of some missionaries who came in 1643, only one more attempt is recorded. In 1708 a Jesuit father, Giovanni Battista Sidoti, landed at an island near Satsuma, but was discovered and sent to Nagasaki and thence to Yedo, where he died in prison 1715.

The policy of seclusion was carried out. Besides the Dutch only the Chinese and Koreans were allowed to trade with Japan, and embassies were sent from Korea on occasions of the Shoguns' assuming the government.

During the centuries that followed, the only notices Europe had of Japan were through the Dutch. Engelbert Kaempfer (1690–92), Charles Peter Thurberg (1775–76), and Philipp Franz von Siebold (1823–30), all physicians to the factory of Nagasaki, contributed above all others to the knowledge of Japan in Europe. The works of Isaac Titsingh, J. F. van Overmeer Fisscher and G. F. Meijlan, who were members of the factory, gave further information about Japan.

Whatever Japan received of the material civilization of Europe was through the Dutch. Especially after the Shogun Yoshimune (1716–45) did away with the proscription of European books, so far as they had nothing to do with Christianity, the study of Dutch books became very popular. Many scientific books were translated from the Dutch, and great progress was made in mathematics, astronomy, medicine, natural sciences and military arts. The official visits paid from time to time by the directors

of the Dutch factory, usually accompanied by physicians, were opportunities eagerly seized by the savants of Yedo to learn more about Europe and her science. The Dutch scholars came to be leaders in thought and many of them played a very important part in bringing about the new era.

At the end of the 18th century this state of quiet seclusion in Japan was disturbed. The English, who were baffled in their attempt to renew the trade in 1673, when they sent the ship *Return* from Formosa, repeatedly visited the Japanese seas after 1791. In 1813 and again in 1814 vessels sent from Batavia by Lieutenant-Governor Raffles tried to get the factory at Nagasaki into English hands, but were thwarted by Director Hendrik Doeff. Before this, the Russians, who had been gradually proceeding southwards from Kamchatka since the beginning of the 18th century, made several attempts to open intercourse with Japan. In 1792 Lieutenant Laxman came to Matsumaye with some Japanese who were wrecked in the Okhotsk Sea and was directed to Nagasaki for negotiations. In 1804 Count Resanoff accordingly came to Nagasaki, but his mission was a failure. In October 1813 Captain Rikord was sent back from Hakodate with Golownin who had been confined in Yeso, since July 1811, with a notice that Japan desired no commerce. In 1837 the *Morrison*, fitted out by an American firm at Macao to return some shipwrecked Japanese, visited the bays of Yedo and Kagoshima, but was driven off. In 1848 Commodore Biddle, who commanded the American fleet in the China Sea, came to the Bay of Yedo with two warships to ascertain if the Japanese ports would be opened and was sent back with a negative answer. An embassy, which King William III of Holland sent in 1844 with the express object of persuading Japan to open her ports to European nations, equally failed. When, however, Commodore Perry entered Uraga with a fleet of four ships, 8 July 1853, and delivered a letter of President Fillmore, asking "friendship, commerce, a supply of coal and provisions and protection for the shipwrecked people," and returned for an answer early the next year a treaty was concluded and signed at Kanagawa, 31 March 1854. Japan consented to open the ports of Shimoda and Hakodate to the American trade.

In 1858 a new treaty was made with the United States, substituting the port of Yokohama for Shimoda, and promising to open Nagasaki, Kobe and Niigata or another port on the western coast of Japan. On the basis of these treaties, Japan concluded treaties with Great Britain, Russia, the Netherlands and France (1854–58) and at somewhat later dates with other Powers of Europe.

The opening of the country after so many centuries of isolation could not be effected without opposition. The Shogun's government was severely criticized for having taken such a weighty step without having first asked the sanction of the emperor. Ii Kamon-no-Kami, Prince of Hikone, was assassinated as being chiefly responsible for the conclusion of the treaties, 24 March 1860. The emperor repeatedly ordered the Shogun to take vigorous measures for the expulsion of foreigners. The Shogun's government tried to explain this state of affairs to the Powers and requested them to withdraw, but the Powers would not consent to do so. Hostile acts of the Prince of Nagato toward foreign vessels passing the Strait of Simonoseki, and frequent outrages committed by Samurais against European residents caused great trouble to the government. These and other troubles induced the Shogun to resign and restore the power to the emperor 9 Nov. 1867. The government of the emperor now took a measure adapted to the need of the times and ratified the treaties, and the emperor received foreign representatives in audience, March 1867. The expulsion of foreigners was, indeed, a cry raised for gathering those who were against the Shogun's régime.

Having once given up her policy of seclusion, Japan exerted herself to the utmost to enter into closer relations with foreign countries. When in 1899 the vexatious problem of revision of treaties was finally solved after so many abortive attempts since 1871, the whole country was thrown open to foreigners and all the restrictions hitherto imposed on them were removed. After her co-operation with the Western Powers during the Boxer trouble in China (1900) Japan was fully admitted to the comity of civilized nations.

In recent times Japan was more than once brought to the verge of war with China: in 1874 when a Japanese army was sent to Formosa to punish some aboriginal tribes in the south for having repeatedly murdered the Japanese subjects wrecked on their shore, and in 1879 when China objected to Japan's making the Ryukyu Islands an integral part of the empire by converting them into the prefecture of Okinawa. But the rupture came when China refused to acknowledge the independence of Korea. The war opened with the naval encounter off the coast of Yashan, 25 July 1894, and ended in a complete defeat of China. A treaty of peace was signed at Simonoseki, 17 April 1895. China acknowledged the independence of Korea, ceded the Liaotung Peninsula, Formosa and the Pescadores to Japan, and promised to pay a war indemnity.

The interference of the three Powers — Russia, Germany and France — which obliged Japan to give up the possession of the Liaotung Peninsula, was very much resented by the nation. The exchange of Saghalien for the Kurile Islands in 1875 was always regarded as an act of injustice on the part of Russia. Russia's advance in Manchuria and her growing influence in Korea alarmed Japan, and war finally broke out, 8 Feb. 1904. After a succession of brilliant victories, both by land and sea, for Japan, peace was made by the Treaty of Portsmouth (q.v.), 5 Sept. 1905. That part of Saghalien, south of the 50th parallel of North latitude, was ceded to Japan. Russia promised to withdraw from Manchuria and acknowledged Japan's special interest in Korea. The new convention between Japan and Korea, 17 Nov. 1905, established Japan's position.

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9. THE SAMURAI. Definition and Etymology.— Samurai, now domiciled in the dictionaries of European languages, is a strictly

Japanese term, being derived from a verb — *samurau*, to attend, to wait upon, to serve. Samurai, therefore, meant originally a person who attended upon another — naturally upon his superior. But the use of the term was confined to honorable and personal service, and as in the course of time, under the régime of feudalism, class distinctions and different grades of honor were instituted and certain kinds of service, notably the military, became more exclusive, the term samurai was applied only to those belonging to the military class of the feudal clans. In a wide sense it included the whole of the military nobility, the warrior class; though in a more usual and restricted sense, it meant the inferior nobility exclusive of the *daimyo*, much like the English knights bachelors, whom Blackstone defines as "the most ancient though the lowest order of knighthood."

The idea of what the samurai was can, perhaps, be better conveyed by comparing him with his compeer in Europe than by a mere etymological explanation. Almost every nation has had at one time or another — especially under the régime of feudalism, but even prior to it — something like the usage of knighting, whether it was done by means of a formal rite or not. Cæsar speaks of the institution of *solduriі* in Aquitaine; Tacitus mentions that of *comitati* among German tribes; the Romans had *equites aurati;* mediæval Germany had *Ritterschaft;* France her *chevaliers;* in fact continental Europe boasted of the existence of *Milites mediі*. It can scarcely escape the most cursory glance that several of these terms bear an etymological relation to the horse, obviously because the knights served on horseback, whereas the common soldiers marched on foot. It is interesting to note, however, that the English word knight has no reference to a horse — its original meaning being the Saxon cniht, signifying *puer, servus* or attendant, this possessing a significance strangely parallel with samurai. Samurai is, or was, explained as being strictly of Japanese origin; but as is the case with every word in the Japanese vocabulary, there is either its equivalent in pure Chinese or a sinified expression for it. In fact, both in literature and formal speech, it was considered more dignified to adopt the sinico form; so that the term *Shi* (the nearest Chinese equivalent for gentry), or *Bushi* (fighting nobility), or *Buké* (warrior family) came to be used almost as commonly as the pure Japanese original. In contrast to the sinico Bushi may be mentioned its archaic equivalent in purest Japanese. The word *mono-nofu* or *mono-nobe*, literally "article bearer," i.e., the wearer of arms — more especially the sword, which was the distinguishing article worn by the order. Some derive it from a word meaning thing-doer, one who acts or does anything, the most important thing of course being fighting. Still another archaic term is *masu-rao*,— strong man, and though this was used in contrast to weak woman, and therefore meant simply masculine personality, it was often applied in the sense of samurai. Both *masu-rao* and *mono-nofu* are now used almost only in prosody.

History.—As has already been hinted at, the germ of the institution of a separate class comprising the fighting force can be found in the term samurai. But it took centuries of gradual development for it to assume a narrow, exclusive meaning. Formerly there was no separate class of warriors. Whoever was possessed of two brawny arms and two stalwart legs joined an army in times of need, and whoever added to strong limbs the possession of a powerful will and stout heart became a leader. Even after the leadership, gained by personal superiority, became hereditary, the fighting force was not separated from the mass of the population.

The constant warfare of the Middle Ages necessitated division of labor — consequently of social classes, and by the end of the 8th century we notice that the samurai formed a pretty clearly defined order.

About the 9th and 10th centuries the governors of the provinces were not only appointed from Kioto, where was the seat of government, but were usually dispatched from among the court nobility, much like the prefects of the Roman Empire. They served a number of years in the country, feeling like exiles, always yearning to go back to the court and the capital. While such feeling was general there was little danger of local life becoming strong or turbulent, but as the population grew throughout the empire, and villages developed into towns, the service of a prefect changed to one less onerous and fatiguing. The more ambitious shared with Cæsar the sentiment that they would rather be first in a mountain village than second in Rome. Such men would willingly stay in their provinces, where they would surround themselves at least with a body-guard and perhaps with an army, particularly if they had danger to fear from any source. They took pains to have ready a certain number of trained fighters for emergency. Governors who by these and other means gained influence and power in their localities were soon rooted in them, so that when their term of office expired they either begged for postponement or flatly refused to be moved. Oftener still did it happen that the offspring of the prefects were left behind in the provinces and these were naturally treated with deference by the people. As they and their relatives increased in number, they came to form a class between the high nobility and the rest of the population. They were naturally possessed of landed estates; for in spite of the fact that private ownership of land was forbidden by law, as there was little control exercised by the court, the local magnates actually owned large tracts of land in their own names. It was the owners of large manors (*shoyen*) who were called "great names" (*daimyo*), and these surrounded themselves with armed protectors, to whom the ancient title of *mono-nofu*, or samurai, was applied. This was a quite common origin of hereditary governorship, which later developed into feudal relations. It is not to be inferred that this was the chief cause of feudal institutions. The growth of feudalism was so gradual that no definite dates can be assigned to each step of its progress; but in the 12th century, when Yoritomo inaugurated the régime of feudalism, the samurai order was in full swing of development and continued to flourish during succeeding centuries, until it was abolished in 1871.

We must bear in mind in following the history of the samurai that they never formed a close corporation. The class was kept up by heredity, but was never wholly exclusive. It was recruited from among the peasants, or even from the much despised merchants, provided the candidates proved themselves efficient in any branch of military art. It was also possible for the samurai to adopt promising boys from other classes than their own. While the order could thus be replenished from outside, such of its members as proved unworthy of its privileges could be excluded,— as for instance, by being deprived of their rights of samurai by their lords (daimyo) or by having their lands expropriated. This would leave them without the means to maintain their livelihood, not to speak of their pretensions. Even at present the samurai are recognized under the appellation of *shisoku* (*shi*-class); but this is only a name, implying neither rights nor duties. In 1871, when they were mediatized, many of them surrendered even their title. Their revenues, which had been given them in so many bushels of rice a year, were commuted into interest-bearing bonds and their peculiar privileges were taken away, to make place for the general conscription whereby the whole nation was, so to say, raised to the rank of the samurai, as far as the right of fighting for the country was concerned. Still the order contained about 400,000 families, or 2,000,000 souls, and in every way formed a formidable power in the empire. Primarily a fighting order, the samurai were political rulers in times of peace. In the four-fold classification of the people, they were at the head,— the rest being the tillers of the soil, the artisans and lastly the merchants.

As an army they comprised the bravest and cheapest defense of the nation; as an economic factor they were the most important land owners; and considered merely as consumers they created the chief demand for the finer products of manufacture and art; as an intellectual power they were scholars in every field of knowledge, whereas the priests, if deeper in their studies, confined themselves to Buddhistic lore; as a moral potency they set the standard for the entire nation, and it is in this last aspect that we shall treat the samurai in this article. The moral teachings of the samurai are contained in an unwritten code of ethics, which, for want of a better name, may be called Bushido.

Bushido.— Literally "the way of the warrior," — means the principles which should guide the samurai in his dealings with himself and with the rest of the world. It means the *noblesse oblige* of the fighting order, the Precepts of Knighthood. It may be roughly rendered as the moral notions of Japanese chivalry. Very often the term is employed in a broad sense when it includes more than moral precepts, bringing within its compass the technical arts which a samurai was expected to master. Of course these arts were mainly of a martial character, e.g., fencing, jiu jitsu, horsemanship, the use of the spear and of the bow and arrow — later of the gun. As improved methods of warfare were introduced, the technical part of Bushido training lost its importance, except as an efficient mode of physical exercise; but its ethical part is still a spring at which the Japanese people drink and refresh their moral existence.

Before proceeding with a résumé of its precepts, it may be well to dwell more fully upon the fact that Bushido is not a written code of morals. It possesses neither a Bible nor a Koran, and though the writings of Confucius and Mencius furnish it with no mean ethical principles, Bushido is neither Confucianism nor Mencianism. There is no systematic treatise on the principles or precepts of Bushido, and if now and then an attempt was made at one, it failed of general acceptance. Like a Volkslied or proverb, it is the product of many minds that put a word there or changed it here, and which the mass of its followers sanctioned as true to their experience; or — to take a more dignified example, its growth was like that of the British Constitution, unformulated and unwritten, but not the less with mighty power to accuse or excuse man's action. It consists largely of the modus operandi of right conduct and soul discipline. The last expression — soul discipline — is used advisedly, as I hesitate to use freely a more exalted term — spiritual culture. If asked to enumerate the articles of faith and of the ethical doctrines of Christians, one might answer by presenting a copy of the Bible or perhaps the Nicæan creed or a treatise on theology; but if asked to tabulate the duties of an English gentleman, one would feel the inadequacy of any systematic treatise. The letters of Chesterfield cover but a small fraction of a gentleman's duties, and Froissart's Chronicles and the Waverley novels do not form a system. This is exactly the case with Bushido. Japanese literature is not altogether wanting in attempts at a more or less orderly presentation of the samurai's duties and privileges; but none rose to the rank of a classic and none was adopted as a standard. The samurai belonged to different clans, being retainers of different lords. Though the daimyo were usually in hostile relations one to another, and though their retainers necessarily shared in these relations, still there was the consciousness of a common bond, the sense of identity of interests among them. They knew their vocation and interests, as distinct from those of other classes of the community, were the same regarding themselves, irrespective of the differences of the clans in which they served. *Bushi wa aimi tagai* ("the samurai are the same one with another"). Being so closely allied in their calling and interests, it was only natural that they should come to adopt — even without mutual consultation or joint session — the same rules of conduct, primarily, as I imagine, in their public quasi inter-state, or literally inter-clan relations, and later in their private conduct.

It is almost axiomatic that the ethical obligations of any social, exclusive class show wider divergencies than the laws of morality which unite man to the world in general; in other words, a class such as the samurai has a very high conception of some responsibilities and yet it may tolerate the most lax ideas in others. It cannot be denied, as Crozier says in his 'Civilization and Progress,' that "the code of honor which regulated the intercourse of the upper classes in the old aristocracies had much more influence on their conduct than the ten commandments." The

strength and weakness of any class morality lie just here, and this is true of Bushido. In its eagerness to foster the masculine virtues, it neglected the proper education of the gentle sex; in its one-sided appreciation of military valor it discarded industrial worth; in its exaltation of samurai prerogative it set at naught the commonest rights of the plebeian order. But it is not the shortcomings of Bushido which have impressed the nation, but its practical precepts. What is deficient and defective in this moral régime can be remedied and supplied by the growth of democracy, which is irresistible, whereas the qualities it has impressed upon the nation are such as cannot easily be promoted by democratic institutions. To give a few of the more prominent moral sentiments particularly cherished by Bushido, we will briefly describe its sense of honor.

In Japan it is more usual to employ the word *renchi-shin* (literally, the sense of shame) as equivalent to the sense of honor, which characterizes every repertoire of knightly virtues. The worst thing which could be affirmed of a samurai was that he knew not shame. The two conceptions of honor and shame are so intimately allied that they not only seem inseparable but the reverse and obverse of the same thing. Honor sounds like an accretion gained over and above one's ordinary lot, and shame savors of something of which one is deprived. Shame is a painful sensation which accompanies the knowledge of guilt. It is what Kant would call the natural and immediate punishment for one's own conscious commission of sin or omission of duty. It is the self-knowledge of disturbed moral equipoise, and the more perfect the balance the more sensitive is it to the slightest disorder. Shame is the most delicate index of moral health, and the bushi was required to distinguish what constitutes shame and to avoid it. Like the English word shame, *haji* means first of all a painful sensation excited by a consciousness of guilt or impropriety, in which case it was a spiritual experience of an individual, irrespective of his relation to others; but it also means, secondarily, reproach or contempt incurred from outside.

It may be asked by what standard was the guilt or innocence of a deed, involving honor or shame, to be decided. A deed or thought that in the least clouded the lustre of the immaculate mirror of the mind was forthwith deemed shame. This simple faith in human nature was accepted as an axiomatic truth, no attempt being made to demonstrate it philosophically or theologically. Shame, therefore, was not explained; it was to be felt and avoided. As to honor,— the opposite of shame, — it was identified with a good name, and hence with reputation and fame. The error into which young samurai fell so easily and so naturally was to confound these and to endeavor to acquire name — rather fame — by means of any sort. Hence emulation and rivalry sometimes went beyond the limits of commonsense and wisdom. Another danger to which samurai youths were exposed was a false sense of shame — *malus pudor*. Misfortunes which could be rationally explained, or in Western lands would be termed "acts of Providence," were often construed as deeds for which the individuals concerned held themselves responsible, and so many a useful life found a self-sought end. We are disposed to think that the emphasis placed on conscience as the criterion for honor or shame, for virtue or vice, for good or evil — sharing as it does the practical doctrines of Socrates and the mystic tenets of Jacob Boehme and George Fox — was on the whole a healthy and beautiful teaching to follow, being based on the very root of moral consciousness.

The exaltation of benevolence was a logical outcome of a practical accompaniment of a sense of shame. Malice would be fatal to the highest instinct of honor, benevolence alone being consistent with it. By benevolence it meant love commingled with pity and mercy, which one feels toward one's inferiors. It was par excellence a virtue of princes. They represented divine powers, ruling over their subjects with authority derived from heaven. This theocratic idea explains the comparative beneficence of the feudal régime. Paternal government was also based on the assumption that the ruler mediates between heaven and man, and thought weakness of the system is apparent, it must be borne in mind that absolutism and feudalism were largely built on moral principles. Benevolence, however, was not altogether to be confined to the rulers. Every samurai was to be mindful of it in his transactions with his inferiors, with the weaker sex and with weaker men — with defeated enemies. It was considered disgraceful in samurai to take advantage of the weakness of others. Strategy and *ruse de guerre* were of course entirely justified in warfare; but even then some warriors went so far as to give ample opportunities to their enemies for due preparation. In private life, too, benevolence and the gentle virtues — magnanimity, forgiveness, mercy and pity — were ever extolled as befitting the noble occupation of the samurai. "Superior men hate sins but not the sinner," said Confucius. It may not be amiss to observe here that the religious instinct of Japan, as expressed in Shintoism, never invented a hell, though it looked for a spacious firmament as an abiding place for the souls of the dead. In fact it has rarely spoken of sin except as defilement or contamination.

As benevolence is a virtue which the superior observes toward his inferiors, it is largely that of a ruler to his subjects. As to the subjects themselves,—the samurai proper, —Bushido laid particular stress on what may be called the reverential virtues: namely, those which men should observe in their dealings with people above them, such as loyalty toward their lord and master, filialty to their parents, and, in the case of the woman, obedience to her husband.

Of loyalty it has been said that it is the most deeply implanted virtue of the Japanese race. To be faithful in serving the master was equivalent to loving the country with which he is identified. Patriotism and loyalty therefore are hardly separable in Japanese ethics. In the feudal period, loyalty meant faithful service to a daimyo, who in his turn owed allegiance to the emperor. Percival Lowell has charged the Japanese with impersonality. In one sense he is right; in another he is quite astray. In no other code does per-

sonality preponderate as in Bushido. One may say that an anthropomorphic element dominates the precepts of Bushido. The samurai were men of action, speculation being either an intellectual pastime or a method of mental discipline, and they were interested in concrete things. They cared little for abstract principles which regulate the relations between lord and retainer; their concern was to serve their daimyo with all their soul and body. And yet it must be noted that in personally serving his master (a man in flesh and blood) the samurai was not required to be a slave, pandering to every freak or fancy of a despot. If he thought his lord wrong, faithful service demanded that he should lead him into the right path. An unscrupulous flatterer who made it his trade to satisfy the self-will of his ruler gained no place «i' the story.» If all his admonitions and requests availed nothing he resorted to the last appeal of disembowelment.

Allied to loyalty was the virtue of filialty so often dwelt upon in the precepts of knighthood. Under the feudal régime, each samurai had to furnish a certain number of armed men according to the amount of revenue granted him by the daimyo. As each holder of a benefice, that is to say, each head of a family, was held responsible for military service, the family and not the individual was the social and political unit. Added to this fact was another, namely, the custom of ancestor worship. These two considerations made family relations compact and rendered the chief of the family an important moral and social factor. If the Arab practice of polygamy is kept up not solely by amorous sentiment but from an economic motive, neither was the feudal integrity of a family maintained wholly by moral regard. Whatever may be the sociological aspect of filialty, upon it and loyalty is founded the entire fabric of Japanese morals. This explains the important rôle the father plays in the economic or a feudal society. Moreover, the conservative ethics imported from China, hallowed the traditional ancestor worship of the race and it is clear without further explanation what filial piety must mean in the moral system of Japanese feudalism. Few motives of action are stronger in the Japanese mind than the glorification of his family.

In comparison with the father, the mother was not counted a social or political unit, and this fact helped to enhance her value within the family. It is only reasonable to expect woman's share to be small in a militant society, such as feudalism produces. At the same time, when a father's service is largely concerned in the welfare of his lord and of the community, the government of the household and the education of the children are naturally left to the mother. This has been distinctly true among the samurai. The assistance rendered by woman to the general welfare, and more particularly to her husband, was called *naijo* — the inner help — the service hidden from unconcerned eyes. It was a work directly known and appreciated only by the members of the family and chiefly repaid by the sons in their filial love and pious remembrance. Hence, though little note was taken of woman's position in public, within the family it was not much inferior to that of the *pater familias*. Woman's influence in Bushido was largely exercised through her position as mother. The education of the samurai was in its earliest stages naturally left to her. And here it is important to note that, while among the daimyo concubinage was usual and the children, legitimate or illegitimate, were frequently reared by nurses, the samurai could ill afford to keep mistresses and the bringing up of their children was considered the proper work of the mothers. This explains the general superiority, both physically and intellectually, of the samurai over the daimyo.

A point of great moment in the education of the samurai youth was the inculcation of courage, bravery and fortitude. The arts of war and the technique of warfare were of much less importance than the mental and moral aptitude of the fighters. When two combatants confronted each other on the field, the question was not which party should win, but who would prove himself the braver — even though defeated. Children were therefore taught to admire daring deeds and deeds of endurance. In the pedagogics of Bushido, children were often subjected to severe tasks, in order to inure them to hardships. The pangs of cold, of hunger, of fear or dread, were almost systematically imposed upon them. They dared not shirk sorrow or pain. How could they when honor might at any time require them to commit *seppuku*,— disembowelment?

In Japanese anatomy, the *hara*, which is the comprehensive region between the breast and pelvis — including the stomach, gall-bladder, spleen, liver and intestines, was believed to be the seat of the soul. This view was shared by the Greeks who used the terms *thumos* and *phren* for the same part of the body, and also by the Hebrews, who looked upon the bowels as the seat of passion and compassion. We know that there are important ganglia in the abdomen and how susceptible they are to any emotion. The custom of splitting the abdomen, though it may at first seem ridiculous, came from the idea that if one's spirit resides there, one can show by disemboweling himself his innermost thoughts and the motives which actuated him. Seppuku was thus thought the most honorable mode of ending one's life and was therefore confined to the samurai class. It is a great mistake to look upon it merely as a process of committing suicide. It was sometimes imposed as a legal punishment in which case there was no actual cutting of the abdomen, but decapitation by a *kaishaku*, who was often the friend of the condemned. Disgrace of the father, that is of the family, name, is of all things the hardest for a samurai to endure.

The training of a samurai was no light work. Indeed his whole career was far from being smooth and easy. Constant vigilance was the price of his status. If fighting had been his only vocation, we might have had a quarrelsome, bloodthirsty animal, and such a type was not wholly wanting, though it was despised as that of a «boar»-sumurai. When it existed it was chiefly found among the young, and it was exactly this rude type with its haughty, swaggering manners, which attracted the notice of foreigners. But this low type was far from the ideal of Bushido. Intellectual culture combined with a strong will, refinement of manners that would not sink

into effeminate mannerism or obsequious conventionality, superiority in the two accomplishments of war and peace, of military and literary arts. (*Bun-bu Ryo-do*), was the goal aimed at. In speaking of the ideals of Bushido one cannot help calling to mind the guardians of Plato. It is not by accident or jest that Mr. Wells has chosen the name of samurai for an ideal social class in his 'Modern Utopia.'

Striving after an ideal, imperfect as it may have been, the life of a conscientious samurai was a strenuous one, and so in popular literature his lot was often bewailed; for, like all wholesome moral systems, Bushido taught more of duties than of rights. The samurai had few rights above the commonalty, and what rights they enjoyed did not amount to any substantial benefit. If he had a desire for wealth, a merchant's lot could better secure this. If his inclination were for mere pleasures, he might well envy a tradesman. If his taste lay in literary ease, religious retirement would assure him that. Luxuries he had to forego and even his pleasures were regulated. In spite of some degree of laxity which public sentiment tolerated, the strict régime allotted him only a certain kind of dance, of music and of pastime. The two swords which it was the privilege of the samurai to carry served more as a reminder of the dignity and responsibility of his calling than of its privileges.

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10. EDUCATION IN JAPAN. Introduction.— In 270 A.D. the king of Korea sent his ambassador to the Imperial Court of Japan. This led to the adoption of the Chinese learning, which, for more than 1,000 years, was the most important factor in the Japanese educational system. From time to time Japan sent special missions and students to China for study, while many Chinese and Koreans went to Japan and were naturalized.

With the advent of Chinese learning Confucianism soon became the foundation of Japan's moral and literary education. About this time Buddhism also entered the country. It found devout adherents at the court, and priests went in large numbers to China to study Buddhism and its literature. Out of the joint influence of these two, her social refinement was attained. Early in 701 A.D. we find an educational system laid out in the Taiho* Statute. A state university was founded in the capital, Kioto, and provincial schools were established in the provinces, while powerful families in the provinces founded private schools to educate their own children and those of their relatives and retainers. It was maintained that the basis of all good actions lies in filial piety, and copies of 'Kōkyo,' or the 'Treatise on Piety,' were distributed throughout the empire and every home had a copy. Thus moral education was encouraged. At this epoch literature also flourished among the women of high class. But the pen was soon obliged to give way to the sword. The powerful families in the provinces waged war upon each other, while at the court people passed most of their time in composing effeminate poems, and seldom cared to enter deeply into the study of literature. On the other hand, the military class had no spare time to devote to learning, and literature became the sole monopoly of the priests. They taught their neighbors' children in the annexes to the temples, hence came the word "Terakoya," or children's house of the temple, which institution survived even until the establishment of the modern elementary schools.

In 1603 A.D. Tokugawa Iyeyasu founded the Bakufu or Shogunate in Yedo. When peace was restored, he encouraged arts and learning. In 1691 A.D. Tsunayoshi, the fifth Shogun, founded a college which was the origin of the "Shoheiko," the highest seat of Chinese learning in Yedo. Distinguished scholars came out of this school and literature again prospered. Feudal lords in the provinces, following the example of their feudal chief in Yedo, also set up schools for the sons of their retainers. These may be called the public schools of the time. There were also many private schools established by scholars on their own account, who taught young men Chinese classics. These schools, it must be remembered, chiefly taught the doctrines of Confucius and Mencius, together with literature and history. "The common people need not be profoundly taught; they should be made chiefly to rely upon the rulers," was the educational policy of the government. But after the Middle Ages, the Terakoya prospered and was free to all. During the régime of Tokugawa, peace continued for more than 250 years, which led to the rapid development of *belles-lettres*. The pure Japanese literature, rivaling the Chinese classics, began to gain much attention, and it soon made wonderful progress and attained a height heretofore unknown. The intercourse with foreign countries became more frequent under the early Tokugawas and by the study of the Dutch language the enlightenment of the West was introduced into the country. Many people studied medicine, physics, chemistry, etc., together with the foreign military science. Later, the Bakufu itself established in Yedo an institution called the "Bansho-torishirabe-sho," the Place for Investigating Foreign Books, and also a medical school called the "Igakusho," i.e., the Place for Medical Study, which gave a great impetus to the study of Dutch. Toward the close of the Tokugawa régime, some began to study English and French books also, while others went abroad for study by the order of the government and in unauthorized cases ran away from the country for the same purpose. In short, learning which had declined during the Middle Ages again prospered during the Tokugawas, and besides the prosecution of the Chinese literature and philosophy, there arose gradually a new field of the Western science, producing many distinguished scholars even among the common people.

In 1867 A.D. the Shogunate came to an end,

* Name of the era.

which led to the restoration of the imperial power. All institutions, and especially the system of education, were radically reformed. In 1872, the "Gakusei," i.e., the Educational Code, was promulgated. The basis of the new system was laid. The empire was henceforth to be divided into eight university districts, each one of which was divided into 32 middle school districts, while each middle school district was again subdivided into 210 elementary school districts; and the schools of the corresponding grade in each district were to be established. But it was found that this system could not be well carried out in its entirety, and many revisions of the ordinances relating to universities, normal schools, middle schools, elementary schools, etc., had to be decreed, but no fundamental changes have taken place since that time. In 1890, the ordinance for the elementary schools was revised and a system of compulsory education was adopted. When local conditions demand it, the school year may begin on the 1st of September and end on the 31st of August. On 30 Oct. 1890, the Imperial Rescript with regard to education was proclaimed and the moral basis of Japanese national education was definitely settled. The English version of the Rescript reads as follows:

KNOW YE, OUR SUBJECTS:

Our Imperial Ancestors have founded Our Empire on a basis broad and everlasting and have deeply and firmly implanted virtue; Our subjects ever united in loyalty and filial piety have from generation to generation illustrated the beauty thereof. This is the glory of the fundamental character of Our Empire, and herein also lies the source of Our education. Ye, Our subjects, be filial to your parents, affectionate to your brothers and sisters; as husbands and wives be harmonious, as friends true; bear yourselves in modesty and moderation; extend your benevolence to all; pursue learning and cultivate arts, and thereby develop intellectual faculties and perfect moral powers; furthermore advance public good and promote common interests; always respect the constitution and observe the laws; should emergency arise, offer yourselves courageously to the State; and thus guard and maintain the prosperity of Our Imperial Throne coeval with heaven and earth. The way here set forth is indeed the teaching bequeathed by Our Imperial Ancestors, to be observed alike by Their Descendants and all subjects, infallible for all ages and true in all places. It is Our wish to lay it to heart in all reverence, in common with you, Our subjects, that We may all thus attain to the same virtue.

The 30th day of the 10th month of the 23d year of Meiji.

(IMPERIAL SIGN MANUAL. IMPERIAL SEAL.)

This Rescript is the foundation of the moral education of the Japanese people. After the new educational system "Gakusei" was established and its details proclaimed, many foreign scholars were employed and a great number of students were sent abroad to study. Japan now naturally entered a transition period which blindly welcomed new ideas and as blindly dispensed with old ones. Some radical followers of the new learning espoused the American utilitarianism which they half understood, while others loudly advocated the French idea of liberty. Then came the German system of philosophy and methods of education. To oppose these tendencies there arose the "Kokusui hoson shugi," i.e., the principle of preserving the country's traditions. In the midst of darkness and confusion which these conflicting elements occasioned and enhanced, appeared the above Rescript, which set at rest much of public anxiety and enlightened the educational world.

One great advantage of Japanese education is its complete separation from religion. Any conflict on this subject is unknown. In 1899, the Minister of Education issued an instruction to the effect that all government and public schools as well as those schools the curricula of which are fixed by ordinances, should teach no religion whatever in the school hours or even outside of them. This instruction made the separation between education and religion complete.

Ever since the restoration, the whole nation has striven to advance education, in spite of incessant political troubles, civil and foreign wars. The improvement not only in the equipment of schools, but also in the personnel of the teaching staff, is continually being made the object of special attention by the Department of Education. The table which follows shows the gradual increase of pupils and students in different scholastic institutions.

If classified according to the nature of instruction given, Japanese education may be divided into three distinct parts, viz., general, special and technical. But in the wide sense of the term, special education includes technical education, and so the latter comes under the control of the Bureau of Special Education. If classified according to the grade, it comprises the three degrees of elementary, secondary and higher education. General education consists in teaching of such subjects as are essential to the people as a whole. It is given in schools be-

KINDS OF SCHOOLS	1915	1914	1913	1912	1911	1907
Elementary schools	7,263,733	7,095,755	7,037,430	7,023,661	6,861,718	5,514,735
Blind and dumb schools	2,848	2,789	2,669	2,571	2,238	1,536
Normal schools	27,739	27,928	27,653	27,076	25,391	18,928
Higher normal schools	1,088	1,077	1,091	1,070	1,093	938
Higher normal schools for women	693	689	659	590	506	357
Special institutes for the training of teachers	186	166	122	55	52	91
Middle schools	136,778	131,946	128,973	125,304	122,345	108,531
High schools for girls	90,009	83,287	78,128	64,809	56,239	35,876
Higher schools	6,215	6,359	6,537	6,665	6,341	4,534
Imperial universities	9,611	9,572	8,946	7,438	7,239	6,397
Special schools	30,422	30,109	27,048	27,468	26,244	25,573
Special technical schools	7,505	7,098	6,896	6,983	6,694	
Technical schools of secondary and primary grades	48,422 38,975	80,922	74,869	70,085	64,739	222,953
Technical continuation schools	446,844	384,983	346,767	302,341	262,978	
Institutes for the training of technical school teachers	185	173	170	156	177	137
Sericultural institutes		338				
Miscellaneous schools	166,244	154,428	148,761	142,868	145,123	142,695
Total	8,275,497	8,017,619	7,893,719	7,809,140	7,589,117	6,083,281

longing to the elementary and secondary grade, such as the elementary schools, other schools of a similar grade, kindergartens, normal schools, middle schools, high schools for girls, other schools of a similar grade as the two preceding, higher normal schools, etc. Special education consists in the teaching of the advanced sciences and arts and constitutes mostly the domain of higher education, including the universities. Technical education consists in the teaching of all those sciences and arts necessary for preparing the pupils in trades, agriculture and industries. The technical schools which belong to the elementary grade are the supplementary technical, the apprentices', agricultural and commercial schools of the lower grade. Those which belong to the secondary grade are agricultural, commercial and industrial schools of the middle classes, while higher industrial, higher agricultural or higher commercial schools come under the head of higher education.

Educational Administration.—The highest central authority which directs the affairs relating to education is the Imperial Department of Education. Since 1871 it has its seat in Tokio and constitutes one of the nine departments of the Imperial Japanese government. The Minister has entire control of all educational matters of the empire, except those placed under other departments on account of special reasons. For instance, the Peers' School is under the control of the Imperial Household Department; Military and Naval schools under the Departments of Army and Navy; schools for Mercantile Marine, for Post and Telegraph are under the management of the Minister of Communications; while all schools in Formosa are controlled by its governor-general under the orders of the Minister of Interior. The Minister issues the departmental ordinances, instructions, etc., in exercising his administrative powers.

As the assistant officials of the Minister there are a vice-minister, two parliamentary secretaries, three heads of bureaus, councillors, a private secretary, secretaries, inspectors, an officer of school hygiene, a superintendent officer of schoolbooks, examiners and compilers of schoolbooks, architects, clerks, etc. The three bureaus are styled respectively the General, the Special and the Religious. The secretariat of the Minister is divided into five sections, viz., those of private secretary, drafting, accountant, school books and charts, and architecture, and each section has a director. The vice-minister assists the Minister in managing the affairs of the department and has the immediate superintendence of the works of the different bureaus. Each head of the bureau takes the charge of his own bureau and is responsible for its affairs. The Bureau of Special Education takes charge of the affairs relating to higher education; the Imperial universities, high schools, special schools, the Imperial Academy, etc., coming under its control. The Bureau of General Education takes charge of the affairs relating to general education; normal schools, middle schools, high schools for girls, elementary schools, kindergartens, schools for blind and dumb, educational associations, libraries, museums. It also takes charge of the affairs relating to school hygiene and investigates for the improvement of the Japanese language. The Bureau of Religions which formerly belonged to the Department of Home Affairs was removed to that of Education in 1913. It supervises the ecclesiastical affairs of the country. But it must not be supposed that by this combination religion forms any part of school education, as these two are kept entirely independent of each other. The Bureau of Special Education also takes charge of the affairs relating to technical education; industrial schools, agricultural schools, commercial schools, apprentices' schools, supplementary technical schools, etc., being under its cognizance. For the purpose of inspection seven regular inspectors act for the Minister. Their duties consist in inspecting the state of education throughout the country, but while they are in Tokio they also serve in the different bureaus and assist in managing their affairs. They inspect the condition of educational administration and the state of school education, hygiene and finance, etc., giving such advice and instruction as may be necessary. During their tour they submit to the consideration of the Minister any question calling for speedy action, and when they return at once report to the Minister orally, and within a month send in a written memorandum. Besides these permanent inspectors there are professors in higher and other schools, etc., who are provisionally charged with additional and special duties of inspectorship on particular subjects.

The education investigation committee is under the control of the Minister of Education and was first appointed in 1913. Its duty is to investigate important matters relating to education, to express an opinion upon questions submitted to it by the Minister, as well as to present to him its own opinion upon various matters. The committee is composed of representatives not only of educational authority, but also of all circles outside of them, and consequently it is many-sided in its nature. Under the superintendence of the Minister there are also several standing commissions for special matters. For instance, the Commission for Examining the Qualification of Teachers has the charge of testing and examining the candidates who wish to become teachers of normal, middle or high schools, etc. The schoolbooks and charts investigation committee is under the supervision of the Minister of Education and compiles, examines and discusses the schoolbooks and charts on morals, history and the Japanese language, used in the elementary schools. It also examines matters relating to other schools, books and charts, if they are submitted to it by the Minister. The Board of Seismology investigates and experiments to find the best suitable construction for guarding against the effects of earthquakes, and pursues scientific investigations for predicting earthquakes. The Board of Geodesy manages affairs connected with the International Geodetic Society and investigates various subjects bearing on geodesy. The Special Observatory for the Measurement of Latitudes is occupied with affairs connected with the measurement of the variation of latitudes in accordance with the contract entered into between the government and the International Geodetic Society. The Commission for the Compilation of Catalogues of Scientific Literature conducts the affairs connected with the

International Committee organized for the same purpose. The Commission for the Examination of Medical Practitioners takes upon itself the work of periodical examination of physicians. A similar commission exists for the examination of pharmaceutists. The aim of the Imperial Academy is to promote the advancement of the sciences and arts and gives assistance in propagating the salutary influence of education in general. It has 60 members, chosen from among the most distinguished men of learning; foreigners who have rendered special service to science and art are made honorary members. There are also a Board for Editing and Collecting Materials of the Restoration (of Meiji), and an Institute for the Investigation of Contagious Diseases. Besides these the minister has the control over the Imperial Library and the Central Meteorological Observatory.

The principal local instrument of education is the governor. The whole empire with the exception of Chosen (Korea), Taiwan (Formosa) and Karafuto (South Saghalien), is divided into one Do, three Fu and 43 Ken, each of which has a local governor. Each governor takes charge of administration of his locality. All Do, Fus and Kens are local administrative districts and are at the same time self-governing corporations. Each governor has inspectors under him who attend to school matters under his jurisdiction and is mainly responsible for the expedition of educational affairs. Fu and Ken are divided into Gun, and each Gun has its chief official called "Guncho," who is in turn assisted by an inspector on matters relating to schools. Cities, towns and villages are also self-governing corporations, and have a mayor or a headman. The mayor or headman manages the educational affairs relating to cities, towns and villages, respectively. It is designed that a school committee should exist in every Fu, Ken and Gun, as well as in every city, town and village, but at present they exist only in cities, towns and villages. The local governors specially appoint school physicians for every public school, but at present those schools established by villages, as well as those of poorer districts with a population of less than 5,000, may be exempted.

Primary Education.

Elementary Schools.— The government began to take serious notice of national education after the Imperial Restoration (1868). Previous to that people who wished their children taught sent them to "Terakoya," where they obtained the rudiments of knowledge, as already mentioned. In 1872 the "Gakusei," or the Ordinance for Educational System, was issued, and elementary schools were established, part of the expense being borne by the state. In 1879 this ordinance was replaced by another called the "Kyoikurei," or the Ordinance of Education, which was again revised in the following year, and also again in 1884. The Kyoikurei was followed in 1886 by the "Shogakkorei," or the Ordinance relating to Elementary Schools. Thus the basis of the present educational system was gradually laid. In 1890 further revisions were introduced, and in 1900 the present system was adopted, which was also partly revised in 1903, 1907, 1911 and 1913. The aim of the elementary schools is to teach the foundation principles of moral and popular education, giving such knowledge as is essential for life, care being also taken to develop the physique of the children. Religious teaching having no place in the Japanese system, the foundation of the general education consists of the moral, the intellectual and the physical training. There are no preparatory schools in addition to the middle schools as in some countries. Hence everybody, rich or poor, high or low, must first enter the elementary school. Thus the Japanese elementary schools give, in the strictest sense of the term, the national education. The only exception to the rule is found in the Peers' School where the boys of the high classes are taken.

Elementary schools are divided into two kinds, viz., the ordinary and the higher. The former has a course which extends over six years, while in the latter the course varies from two or three. The period of our compulsory education, which used to be four years, was increased to six in 1907, and since then the result has been quite satisfactory. In the higher elementary schools a more advanced grade, or in other words continuation of the ordinary elementary school course is given. A considerable portion of the elementary schools have both of these grades. All elementary schools may have a supplementary course. The course must not run for more than two years, and the subjects, and the season of the year in which they may be taught, are determined according to the requirements of the locality. Unlike the system of some German states, these courses are not yet compulsory. Cities, towns and villages must all establish their own ordinary elementary schools. But if a self-governing corporation is too poor or there exists some special reasons against establishing its own school, the education of its children may be entrusted to other corporations, or it may have a school in common with some others. Higher elementary schools not being compulsory are generally established by self-governing corporations on the approval of their local governors. Private persons can also establish elementary schools on the same condition. The school age of a child begins on the next day after reaching his sixth year and ends on the day when he completes his 14th year, the whole term covering a period of eight years. His schooling should commence at the beginning of the first school year that comes within the period of his school age, and should end at the conclusion of his ordinary elementary school course. During this period, his guardian is responsible for his attendance at school. If they wish to have the children taught at home or in private schools they must first apply for permission to the authorities. In no case, except the absolute poverty of the guardian or the idiocy, deformity or illness of the children, may they be excused from these responsibilities. Children still in the age of compulsory education may not be employed to the neglect of their education. According to the latest statistics 98 per cent of boys and 97 per cent of girls of school age are studying in schools. Formerly the custom was not general among the common classes to educate girls, but guardians have seen now the need of educating the girls as well as the boys.

TABLE SHOWING THE PERCENTAGE OF SCHOOL POPULATION RECEIVING THE PRESCRIBED COURSE OF INSTRUCTION.

	Boys	Girls	Boys and girls
1914–15	98.80	97.67	98.26
1913–14	98.74	97.54	98.16
1912–13	98.80	97.62	98.23
1911–12	98.81	97.54	98.20
1910–11	98.83	97.38	98.14
1909–10	98.86	97.26	98.10
1908– 9	98.73	96.86	97.80
1907– 8	98.53	96.14	97.38
1906– 7	98.16	94.83	96.28

The subjects taught in the ordinary elementary course consist of morals, Japanese language, arithmetic, Japanese history, geography, science, drawing, singing and gymnastics. Manual work may be added, according to the choice of the locality. For girls, sewing may be added. The subjects taught in the higher elementary schools are morals, Japanese language, arithmetic, Japanese history, geography, science, drawing, singing, gymnastics. For girls sewing is added. Manual work, rudiments of agriculture or commerce may be given. Either one or more of three subjects — manual work, agriculture and commerce — should be added. In case two or more of these subjects be added, the pupils should be taught either one of them. The English language may be taught in commerce, when the local circumstances make this advisable. As regards the curriculum above mentioned, a provision which minutely explains how each subject should be treated is found in the Regulation for Carrying Out the Imperial Ordinance relating to elementary schools. For instance, morals are taught with the Imperial Rescript as the basis, the aim being to form good character and to induce the pupil to act in accordance with moral precepts. It is begun with lessons on filial piety and brotherly love, friendship, diligence and frugality, respect, faith and justice, courage, etc., and the children are gradually led to understand the general duty and obligations to the country and to society. At the same time care is taken to elevate their character, to strengthen their will, to cultivate their enterprising spirit and encourage their love for public virtues as well as their spirit of patriotism and loyalty. For girls such virtues as chastity are specially explained. Wise sayings, exemplary deeds, proverbs, etc., are made use of to warn as well as to edify them. Since the olden times, moral education has always been pursued with much attention in Japan, and now the spirit and the teaching of the Imperial Rescript has became the fundamental principle of Japanese life and pervades every home throughout the empire. The school year of elementary schools commences on the first day of April and ends on the last day of March of the following year. On the anniversary of the accession of the Emperor Jimmu, the present emperor's birthday celebration day (30 October), and on New Year's day, teachers and children assemble in the school to celebrate the occasion and generally employ the day to promote moral instruction. First they sing the "Kimigayo," the national anthem, salute most politely the photographs of the emperor and the empress, and the director reads the Imperial Rescript. In public schools of ordinary elementary grade established by cities, towns and villages, tuition fees cannot be generally charged. In special cases, however, a small amount is charged after permission is obtained from the authorities. This system of free education is attaining its object year after year and the schools in which tuition fees were levied are gradually decreasing. Such being the case, in the near future it is hoped that such schools will disappear. As compulsory education obliges even very poor people to send their children to school, it is proper that all expenditures should be borne by the corporations. In higher elementary schools tuitions can be charged.

Kindergartens.— A kindergarten after the pattern of Froebel was first established in Tokio in the higher normal school for girls. Now the number reaches as many as 605. The object is to train children of three years and upward, until they reach their school age. These institutions are to help to complete home education in the sound development of the mind, the body and of good habits. The subjects of training consist of games, singing, conversation and hand work. The kindergartens are frequented mostly by the children of middle or high classes. Such kindergartens as are prevalent in Europe and America where poor children are kept and trained are yet few in Japan. Competition of life among the lower classes is not so great as to leave parents destitute of means for training and bringing up their children.

Schools for Blind and Dumb.— In schools for the blind and dumb general education is imparted. The grade is that of elementary schools, but there is a professional course which aims to enable them to earn their own living. These institutions, together with kindergartens, come under the Imperial Ordinance relating to elementary schools. The education of the blind and dumb is not yet made obligatory, still the number of the blind and dumb schools has increased recently through the encouragement of the local authorities made in other spheres of education, but the government has shown a disposition in recent years to give more attention to the development of this work. In 1910, the Tokio Blind and Dumb School was separated into the Tokio School for the Blind and the Tokio School for the Deaf in order to separate these two sorts of education. The former is divided into ordinary, industrial and training courses. The industrial course is divided into two courses, viz., music, and acupuncture and massage; and the training course, into three, viz., ordinary, music and acupuncture and massage. In the ordinary course, morals, Japanese, arithmetic, history, geography, science, singing, gymnastics and sewing are taught. The latter is divided into three courses of ordinary, industrial and training, and the ordinary course is subdivided into lower and higher courses, the industrial course into three courses of painting, woodwork and sewing, and the training course into the ordinary course and the courses of painting, woodwork and sewing. In the ordinary course morals, Japanese, arithmetic, history, geography, science and gymnastics are taught.

SECONDARY EDUCATION.

Middle Schools.— Secondary education is conducted in the middle schools for boys and the higher schools for girls, and consists in giving pupils the knowledge and arts essential for the middle classes of society, and also prepares them for special education. Their equivalents are found in the secondary schools of England, lycée of France, gymnasium and höhere mädchenschule of Germany. In Europe and America the schools where secondary education is given have for the most part preparatory departments of their own, while in Japan there is no need of preparatory departments to be provided in the middle schools or high schools for girls, because all children, regardless of the rich and poor, go to the elementary schools.

The middle school deals with intermediate education coming between the university and the elementary school. After several revisions the present ordinance for the middle school was issued in 1899, and departmental regulations for carrying it out were enacted in 1901. The Hokkaido as well as each Fu and Ken must establish at least one middle school. The Minister of Education can order Fu or Ken to establish middle schools when he deems it necessary to do so. Cities, towns and villages can found their own middle schools if they do not impede in any way the progress of the elementary schools. Private individuals may set up middle schools also.

Boys of 12 or older, and who have passed the sixth year of their ordinary elementary course or have similar attainments, are qualified to enter the middle schools. But the increase of these schools, though remarkable, does not afford sufficient accommodation and the applicants have to be admitted by competitive examination. The course extends over five years and a post-graduate course of one year may be added. The school year begins on the 1st of April and ends on the 31st of March of the following year. The number of school days must be over 220 in a year. The number of pupils must not exceed 600. In some particular cases it may be increased to 800. The maximum number of pupils in one class is 50. The subjects taught are morals, Japanese and Chinese, foreign language, history, geography, mathematics, natural history, physics and chemistry, civics, industry, drawing, singing and gymnastics. Industry is agriculture, or commerce, or manual training, and is permitted to be made an optional subject. The foreign language may be either English, German or French, but at present the language taught is practically English. Civics, industry and singing may be omitted for the present. The program of every subject is fixed, as it is in the case of elementary schools. The Imperial Rescript is the basis of morality here as elsewhere. Moral principles that may form a character suitable for the middle or higher class of society are taught here. The teachings of Confucius and Mencius which enforce piety to parents and loyalty to the sovereign have been firmly rooted for over 1,000 years in Japanese homes. Bushido* is also an effective teaching for inculcating higher moral standards and is freely referred to in these classes.

* See Professor Nitobe's work on 'Bushido.'

The textbooks are chosen by the director among the works approved by the Minister of higher grade. Besides they are entitled to get the governor's sanction before he can adopt one. If the director deems it desirable to use a book which has not yet received the approval of the Minister, the governor may sanction its use provisionally if the Minister gives the permission.

The pupils, while they are in the school, are exempted from military service, and when they graduate they may join the army as one-year volunteers. The middle schools not established by either government or local bodies have not these rights, unless they are so approved by the Minister of Education. Graduates from any middle school have the qualifications to be appointed underofficials. Graduates of any middle school may also apply for admittance to any special school of a higher grade. Besides they are entitled to get a license without examination to become elementary school teachers. This middle school or liberal education is recognized as the indispensable basis for entrance to all higher national institutions of learning.

High Schools for Girls.— The general education of women, as already stated, began with the Restoration. It is true Japan has produced many distinguished women scholars who have left immortal names in the field of literature, as well as in other spheres of life, but as a rule under the old régime among the common classes women's education was looked upon as a matter of no great moment. In the early stages of the new system, girls were comparatively few who followed the prescribed course of education in the elementary schools, in spite of the effort of the department. To encourage women's education the department founded girls' schools in Tokio and also sent girls abroad for study; but in consequence of the conflict between the old and the new ideas the education of girls did not receive such hearty response from the public as in the case of boys. Recently, however, public feeling toward the education of women has radically changed, the people have come to attach almost, if not equal, importance to the education of their daughters to that of their sons. The daily attendance of girls at elementary schools is 97 per cent, while that of boys is 98 per cent of those of school age. The middle classes now consider it indispensable to send their daughters to the high schools.

At first, the provision for girls' schools was included in the Ordinance relating to middle schools, but in 1895, they were made the subject of special regulation, and in 1899 the Ordinance for High Schools for Girls now in operation was issued. The aim of the girls' schools, corresponding to the middle school for boys, is to give the pupils an advanced grade of general education; the aim in the education of women is primarily to make good wives and wise mothers. In 1910, an important revision was made in the ordinance and by this revision it is permitted to provide a course in which the chief subjects taught are those relating to household management. A school in which only such a course is instituted is called a Domestic High School for Girls.

The course of study, which extends over four years, may be prolonged by one year. In addition to the regular course, however, a supplementary course not exceeding two years may

be provided, so that the girls may study during seven years where the longest course is open. The course of study in the domestic course extends over four years for the graduates from ordinary elementary schools, over three years for those who completed the first-year course of higher elementary schools, over two or three years for those who completed the second year of higher elementary schools. The subjects of study are morals, Japanese history, mathematics, science and domestic science, sewing, drawing, singing, industry and gymnastics. Singing and industry may be omitted, and industry may be made optional. Those who take two years' course of study are taught only morals, Japanese, mathematics, domestic science, sewing, industry and gymnastics. The regular course consists of morals, Japanese language, foreign language, history, geography, mathematics, sciences, drawing, domestic science, sewing, music and gymnastics. Foreign language, which may be either English or French, may be omitted, or may be made optional. Music may also be omitted for those who have no aptitude for it. Drawing may be omitted. The subjects taught in the supplementary course may be chosen from those taught in the regular course. The special course for the graduates extends over two or three years. Graduates may receive certain favorable treatment when they apply for the qualification of elementary school teachers. Other regulations are similar to those of the middle schools and the provisions in the Regulations for Carrying Out the Ordinances for Middle Schools are generally adopted for use here also.

Higher Education.

High Schools.—Higher education is given in the universities and special schools. There are also a number of schools called higher schools or Koto Gakko. They are not in themselves complete institutions of higher education, but simply teach preparatory courses for the universities. In some respects they may correspond to the colleges in America. In Europe and America those who complete their secondary education can at once enter universities, as well as higher technical schools. But in Japan, the high schools which prepare the pupils for the universities intervene between the universities and the middle schools. Each high school is divided into three departments. The first department teaches preparatory course for those who enter the colleges of law, and literature; the second department for those who wish to study the course of pharmacy, or enter the colleges of engineering, of science and agriculture, while the third department prepares those desirous of entering the college of medicine. In these schools, special attention is paid to the teaching of foreign languages and more hours are allotted to them than to other subjects. But the three years of high school education does much good in the way of building up the boys' physique and character, as well as in giving a more advanced knowledge of foreign languages. The languages taught are either English, German or French. During the time they are in school pupils are exempt from military service, and graduates have the privilege of joining the army as one-year volunteers. They also receive favorable treatment at the state examinations for middle school teachers.

Imperial Universities.

Although universities, broadly speaking, are not new institutions in Japan, yet the Imperial universities as they exist at present owe their origin to the Bansho-Torishirabe-Dokoro of the Bakufu, instituted toward the end of the Tokugawa period. After the Restoration the institution was re-established by the government under the name of the Kaiseijo, or the Place of Enlightenment. The Tokio Medical School, which afterward formed the Seiyo-Igakujo of the Bakufu, together with the institution above cited, formed the nucleus of the Tokio University, which came into existence in 1877 and comprised the faculties of law, science, literature and medicine. In 1885 the school of law, which hitherto had been carried on by the Department of Justice to meet its own requirement, was also incorporated into the faculty of law. In the same year the College of Engineering, similarly under the control of the Department of Public Works, was also taken over by the Department of Education, as the former was abolished. In 1886 the ordinance relating to the Imperial University was issued, and the former Tokio University and the College of Engineering carried on their work under the new name of the Imperial University. In 1890 the Tokio School of Agriculture and Forestry, which had been under the auspices of the Department of Agriculture and Commerce, was transformed into a college of agriculture and added to the Imperial University of Tokio. Thus the Imperial University of Tokio now includes the six faculties, viz., those of law, medicine, engineering, literature, science and agriculture. In 1897 another university was created in Kioto, and is now complete with five faculties of law, medicine, science, engineering and literature. Unlike the universities of the West they have no theological department. The Japanese government in the budget of 1907 authorized the creation of two new independent universities, one in the north and one in the south of Japan. In 1907 the Tohoku (east-northern) Imperial University was established in Sendai and the Sapporo Agricultural School being transformed into the faculty of agriculture was attached to it. Now it includes two faculties: those of science (at Sendai) and agriculture (at Sapporo). Besides, two departments of medicine and engineering, which are the reorganization of the old Sendai Special School of Medicine and the old Sendai Higher Technical School, are attached to it. The Kyushu Imperial University was established in Fukuoka in 1910, and it includes two faculties of medicine and engineering. The ordinance relating to Imperial universities regards them as institutions established for the purpose of instruction in the sciences and arts indispensable to the state, and of conducting independent research in the various branches of learning. The president of the university presides over the whole institution. The head of each faculty takes charge of the affairs relating to his college. The university council is formed from the heads of faculties and one professor out of each faculty. The president calls its meetings at any time and acts as the chairman. The council discusses matters concerning the course of study, establishment of chairs, and the internal regulations of all the

faculties, conferring of degrees, and also other matters submitted to them either by the Minister or the president. It can also lay its views to the Minister of Education, regarding matters of higher education. Sometimes the title of an honorary professor is bestowed by command of the Emperor or by the proposal of the Minister of Education, upon those who have rendered meritorious service to the university or have made some achievements in science deserving of special honor. In every faculty there is an Assembly of Professors consisting of all professors (assistant professors being exclusive) of the faculty. It discusses the curriculum, examinations, conferring of degrees and other subjects submitted to them either by the Minister or by the president. The business officials of the university are the secretary, the superintendent of the students, clerks, etc. The faculty courses of the two universities are as follows:

The Faculty of Law: In Tokio the four courses are law, politics, political economy and commerce. Kioto has two courses of law, and politics and economy.

The Faculty of Medicine: In Tokio the courses are medicine and pharmacy. Kioto has no course of pharmacy.

The Faculty of Engineering: In Tokio the courses are (1) civil engineering, (2) mechanical engineering, (3) naval architecture, (4) technology of arms, (5) electric engineering, (6) architecture, (7) applied chemistry, (8) technology of explosives, (9) mining, (10) metallurgy. In Kioto the courses are (1) civil engineering, (2) mechanical engineering, (3) electrical engineering, (4) mining and metallurgy, (5) chemical technology.

The Faculty of Science: In Tokio the courses are (1) mathematics, (2) astronomy, (3) theoretical physics, (4) experimental physics, (5) chemistry, (6) zoölogy, (7) botany, (8) geology, (9) mineralogy.

The Faculty of Literature: In Tokio the courses are (1) philosophy, (2) history, (3) literature. Kioto has also the same courses.

In the Faculty of Agriculture in the Tokio University the courses are (1) agriculture, (2) agricultural chemistry, (3) forestry, (4) veterinary science, (5) marine products.

The courses of study in the Tokio Imperial University are as follows:

The Faculty of Science: Mathematics, chemistry and geology.

The Faculty of Agriculture: Agriculture, agricultural chemistry, forestry and zootechny.

The courses of study in the Kyushu Imperial University are as follows:

The Faculty of Medicine: Medicine.

The Faculty of Engineering: Civil engineering, mechanical engineering, electrical engineering, applied chemistry, mining metallurgy.

The time of study required in each faculty varies from three to four years. In matters of discipline much freedom is allowed to the students of the university, it being taken for granted that they have already the firm basis of moral culture. The results of investigations of the professors and students are published in the journals of the faculties. The equipment of the universities, although much remains yet to be done, compares favorably with similiar institutions abroad. An astronomical observatory is attached to the College of Science, and a special bureau for Compilation of Historical Materials is attached to the College of Literature. There are also botanical gardens, marine laboratories, hospitals, experimental farms, forestry stations, etc. The universities have contributed much toward the welfare of the nation.

Special Schools.

In 1903 the ordinance relating to the special schools was issued, and those schools which give instructions in some particular branch or branches of science and art, were all called special schools and come under this ordinance. The special schools established by the state are the five Special Schools of Medicine, the Tokio School of Foreign Languages, the Tokio Fine Arts School and the Tokio Academy of Music. The public corporations such as Fu, Ken and city, or private individuals may found special schools. Persons who have completed the prescribed course of instruction in the middle schools or in the high school for girls, with course extending over four years or more, or who possess equal or higher attainments are qualified to enter. Special schools have a course extending over three years or more. Since the special schools give instruction of high grade to young men who have finished secondary education, the state gives the graduate special privileges, as for instance, the graduates from the special school of medicine can practice without any examination and those who have passed through the special school of literature can at once obtain a license of a middle school teacher. Some of the special schools in Japan may be considered as corresponding to the university of lower type found in the United States and elsewhere; they discharge the functions generally belonging to the latter institutions.

Among the private special schools who may call themselves "Daiguku" (university), after permission is obtained from the Minister, the most prominent are the Keiâ-gijuku University, the Waseda University and the Dōshisha University. The first was established before the Restoration of Meiji, in the period of Keiō by the late Yūkichi Fukuzawa, one of the greatest men in Japan, the graduates numbering nearly 10,000. The second was founded by Count (now Marquis) Shigenobu Okuma, now Prime Minister, and his friends in 1882. The graduates are more than 18,000, the third in Kioto was founded by the late Jō Nūshima in 1875, and it is now as well known as the former two. Other private schools having the courses of study relating to law, politics and political economy are the Meiji University, the Hōsei University, the Chūō University, the Nippon University, the Senshū University, etc.

There are but a few special schools in which girls may be admitted. Among the government schools, the Tokio Academy of Music and among the private schools the Women's College at Mejiro are the only places where women can attend.

Technical Education.

Confucianism taught a sublime doctrine which made the people esteem transcendent philosophy and little attention, if at all, was paid to what corresponds to modern utilitarianism. Besides, under the old régime it was con-

sidered that farming, trade and industry needed nothing but experience and that business men would not gain much by study. But with the change of the times and the participation of Japan in the commerce and industry of the world, the establishment of technical education became essential and the department began to encourage it by founding the system of supplementary technical schools, apprentices' schools, by teaching subjects which have reference to industry in the elementary schools, and also by establishing other higher technical schools. In 1894, the Law of Granting State Aid to Technical Schools was enacted, and 150,000 yen was annually paid out of the state treasury for this purpose. It was subsequently increased and now it amounts to 297,661 yen. Measures have been taken to train teachers for these schools. In 1899, the Ordinance for Technical Schools was issued. Its purport is to provide education essential for those who pursue agriculture, commerce and industry. In all Fu, Ken, as well as in Hokkaido (all administrative districts) technical schools may be established and the Minister of Education can order any of them to found a technical school or schools according as the condition of the locality requires them. Any Gun, city, town or village may also establish technical schools if the locality requires them, and if at the same time they do not impede the progress of elementary school education. A chamber of commerce or private individual may also found technical schools. A technical school whether public or whose equipment and course of instruction is considered by the Minister to be efficient is entitled to receive a subsidy out of the national treasury for the period of three years to the amount not exceeding the sum which the original founder appropriates toward its maintenance. This term of subsidy may be renewed.

Supplementary Technical Schools.— According to the provisions of Supplementary Technical School Act of 1902, these schools provide such knowledge as is most useful for those who wish to engage in any branch of trades and industries, and at the same time general education is also continued to supplement what they already have learned previously. The entrance qualifications consist in having some rudiments of general education which are equal or above the ordinary elementary school standard, and in being not younger than 12 years of age. The length of the courses is also fixed so as to suit the local convenience.

Apprentices' Schools.— The apprentices' schools admit pupils who are not younger than 12, and who also have general education equaling the ordinary elementary school standard. The course of study extends from six months to four years and a good deal of freedom is allowed in fixing the term and the school hours. The present regulation was issued in 1904.

Industrial Schools.— These schools are the principal organs of industrial education as fixed by the Provisions for Industrial Schools issued in 1899. Children 14 or older who have received the two years' course of the higher elementary schools, or upward, may be admitted. The course of study extends over three years and it may be lengthened by one year. Preparatory courses may also be added and boys of 12 years of age or upward who have passed the sixth year of the ordinary elementary school are taken. Special courses are also organized for the benefit of pupils who cannot follow regular courses and who wish to learn special subjects.

Agricultural Schools.— The agricultural schools are established in accordance with the Provisions for Agricultural Schools issued in 1899. They are of two kinds, those of A and B grades. A grade schools admit only those who have passed a higher elementary school of two years' course or who have equal or higher attainments. The courses of study run for three years and they may be lengthened by one year. In the B grade, boys of 12 years or older, and who have graduated from the ordinary elementary schools or have similar or higher attainments, can apply for admittance. The course of study extends over three years. In the former grade school, preparatory courses may also be added. Special courses may be established in both.

Commercial Schools.— These schools are founded in accordance with the Provisions for Commercial Schools, issued in 1899. They are also of two grades, commonly termed A and B, respectively. As to the rules of admittance, the length of courses, etc., these two kinds of commercial schools are exactly the same as those of the two corresponding grades of agricultural schools. The only difference consists in the length of the courses. In the commercial schools of A category, they may be continued for five years.

Nautical Schools — Schools of Marine Products, etc.— In 1899 the Ordinance for Nautical Schools was issued. They are of two kinds, and the regulations are about the same as the technical schools above explained. The higher navigation school is under the control of the Department of Communications. With regard to the schools of marine products, the ordinance relating to their establishment and working was issued in 1901. All these schools thus far enumerated belong to the grades of primary and secondary education, and other technical schools which are of a higher standard are called Special Technical Schools and come under the Ordinance for the Special Schools, of which some explanation has already been given. They are mostly government institutions. The High Industrial Schools which give a higher grade of industrial education are found one each in Tokio, Kioto, Osaka, Nagoya, Kumamoto, Akita, Kiryū and Yonezawa. As regards high agricultural and forestry schools, there is one each in Morioka and Kagoshima. As regards higher sericultural schools, coming under the agricultural schools, there is one each in Tokio, Kioto and Uyeda. The schools in Tokio and Kioto are the reorganization of the sericultural institutes which had been transferred to the supervision of the Minister of Education from that of Agriculture and Commerce in 1913. Of the high commercial schools, there is one each in Tokio, Kobe, Nagasaki, Osaka, Yamaguchi and Otaru. Boys who have finished the middle schools or have similar qualifications can apply for admission. The applicants to these schools are so numerous that only one-third to one-tenth of the total number of applicants, the proportion varying with the different schools, can

be admitted. The government and private benefactors are making common cause to establish more of these schools to meet this deficiency of accommodation.

Training of Teachers and the Licenses.

There are special organizations for training teachers of all kinds of schools. For the teachers of the elementary schools there are both boys' and girls' normal schools, and similarly the teachers and professors of the normal schools, the middle schools and the high schools for girls, are prepared at the higher normal schools, of which two each of both sexes exist, i.e., in Tokio, Hiroshima and Nara. Besides these, there are special institutes for the training of teachers, which are attached to several government schools of high grade. To fill up the deficiency of the teachers of domestic science and sewing, a revision was introduced to the regulation for these institutes in 1912 and enabled the authorities of the institutes, if circumstances require, to entrust the instruction of a part of the pupils in the course of domestic science, to any public and private school having the Minister's permission regarding the test of teachers without examination. The schools where pupils are entrusted for instruction at present are the First High School for Girls of Kioto Prefecture, the private Tokio Sewing School for Girls, the private Girls' School of Industrial Arts, the private Wayō Sewing School for Girls. Persons who have not graduated from any of the above institutes, must pass examination to obtain licenses. The government is devoting much attention to providing capable teachers, but some non-qualified teachers are still being employed. After graduation, the pupils are required to serve for a certain period as elementary school teachers in the locality in which they graduated. The periods are four years for male graduates from the first section, five years for graduates from the second section.

Normal Schools.

According to the ordinance relating to the normal schools issued in 1897, one or more normal schools, where elementary school teachers are trained, must be established in the Hokkaido and in each Fu and Ken. The qualifications required for admittance consist of a strong constitution, sound morals and exemplary character. The aim of the normal school education is not simply to give the pupils knowledge essential for teachers, but also to build them up in a strong, virtuous, affectionate and dignified character.

The regular course in normal schools is divided into two sections: the first and the second, and the latter may be omitted, should local circumstances make this advisable. Besides the regular course, a preparatory course and a training course may be provided.

The course of study in the first section extends over four years, for both male and female pupils. In the second section the course for men lasts for one year only, while that for women extends over one or two years.

Candidates for the first section must be graduates of the preparatory course, graduates of higher elementary schools of three years' courses, or persons of not less than 15 years of age, who have attainments equal or superior to those of graduates. Candidates for the second section, must be, in the case of male pupils, graduates of middle schools, or lads of not less than 17, who have attainments equal or superior to those of graduates. In the case of female pupils, if they wish to become candidates for admission to the course in the second section, which extends over 2 years, they must either be graduates of high schools for girls provided with four years' courses, or they must be persons not less than 16 years of age and possessed of attainments equal or superior to those of graduates. But if they wish to take the one year's course, they must either be graduates of a high school for girls with a five years' course, or be persons not less than 17 years of age, and possessed of attainments equal or superior to those of graduates. But, for the time being, even in the case of providing a one year course, graduates from high schools for girls, which had only four years' courses, and persons aged 16, or above, who have similar attainments to those of graduates, were to be admitted.

The object of the preparatory course is to give those pupils who wish to enter the first section of the regular course, the necessary knowledge and training. The course of study lasts for one year. Applicants for admission must either be graduates of higher elementary schools having two years' courses, or be persons possessed of attainments equal or superior to those of graduates, and not less than 14 years of age.

The training course is of two kinds, viz., the training course for elementary school teachers, and the training course for kindergarteners. The former is provided for the purpose of giving the necessary knowledge to those who have licenses as regular elementary school teachers. Sometimes the training course may be provided for the purpose of training ordinary elementary school teachers and regular teachers of sewing. Candidates for admission to the training course for assistant teachers of ordinary elementary schools, whose course extends over one year, must either be graduates of higher elementary schools with two years' courses, or be persons possessed of attainments equal or superior to those of graduates; while candidates for the courses for regular teachers in ordinary elementary schools, and for regular teachers of sewing which extend over two years for the former, and over one year for the latter, must either have licenses as assistant teachers of ordinary elementary schools, or be possessed of attainments equal to those of assistant teachers. The course for kindergarteners furnishes knowledge and training necessary for those who wish to become kindergarteners, and for those who have the certificate of a kindergartener.

Preparatory courses, training courses for elementary school and kindergarten teachers may be opened. Boarding and the school expenses are defrayed by the localities, and the boys after graduation have the obligation to serve as teachers in elementary schools for seven years; during the half of this term they must work in the school which the governor designates. For the girls, the time of service is shorter, being five years, during two of which they are under the same obligations as boys

in respect of working in a particular school to which the authority appoints.

HIGHER NORMAL SCHOOLS.

The higher normal school is an institution designed to train teachers for the normal schools and the middle schools, including high schools for girls. The regular courses of study in the higher normal schools consist of Japanese language and Chinese literature, of English, of geography and history, of mathematics, of physics and chemistry, and of natural history courses. Besides the above courses preparatory and post-graduate courses may be established. The courses run for one year in the preparatory, three years in the regular and from one to two years and a half in the post-graduate. In some particular cases, special courses may be provided, to which elective pupils may be admitted. The special investigation course may also be provided. The applicants for admission for these schools must be graduates from the regular courses of either a normal school or a middle school. The governor of the locality recommends several candidates and the director of the higher normal school chooses out of them. The graduates who receive the whole school expenses and board must serve for seven years, three years of which they must attend the schools to which the Minister of Education appoints them; those who receive part of their expenses, for five years, two of which are in the schools designated by the Minister; and those who have borne their own expenses, for three years.

Besides these there are temporary establishments for the training of teachers where such subjects as are specially needed in secondary schools are taught, for instance, English, Japanese languages, natural history, physics and chemistry, etc. These institutes are annexed for the sake of economy and convenience to the universities or other government schools. The graduates from the middle schools or from the high schools for girls of four years' term may be admitted. The courses of study generally run for two years. No tuition is charged and school expenses and board are sometimes allowed them. If they receive them for certain length of time they have obligation to serve after graduation during a certain period.

Special institutes for the training of industrial, commercial and agricultural school teachers are also established. These institutions are attached to the College of Agriculture of the Imperial University of Tokio, the Tokio Higher Commercial School and the Tokio Higher Technical School. School expenses and board are allowed them. Besides these arrangements, aid is sometimes given to the students and pupils in the College of Agriculture or of other government schools on the condition that they serve after graduation in the technical schools.

THE LICENSES FOR TEACHERS.

All teachers who engage in elementary or secondary education require teachers' licenses. Those in the government schools need none. The general license for elementary school teachers, heretofore granted by the Minister of Education, was discontinued in 1913, and the general and prefectural licenses being united, the one granted by local governors came to hold good throughout the empire. The Minister of Education also issues general license for teachers of secondary schools. The graduates of certain government schools are entitled to receive this license without any formality. A permanent board of examination is attached to the Department of Education, whose work is to examine, generally once a year, applicants desiring to become teachers in the secondary schools. The standard of this examination is being gradually raised in view of the increased supply of properly qualified teachers during the last few years. A complete system of pension for all grades of teachers and professors has been established and has no doubt contributed largely toward making the teaching profession an honorable and a permanent one.

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11. THE RELIGIONS OF JAPAN. Preliminary Remarks.— The religious history of Japan is characterized by incessant influxes of foreign religions. The minds of the people have not remained wholly passive towards these influences, but a free and spontaneous development of religious thought and sentiment was almost impossible. The interest of the history, therefore lies in the manifold aspects of the foreign influences, in their adaptations to the national genius and in the several amalgamations which have resulted from these interferences.

In considering the entire history, five periods may be distinguished: (1) The prehistoric religion of the Japanese was an unorganized worship of spirits, both of nature and of the dead. It was, toward the dawn of history, developing a form of ancestor-worship, being closely connected with the clan system. (2) The introduction of Buddhism in the 6th century A.D. gave a new turn to the religious development. During the seven centuries following, various forms and teachings of Buddhism which were prevalent in the Asiatic continent were successively imported. But these importations prepared for more original experiences of the people. (3) The 13th century is marked by the appearance of new forms of Buddhism which were more or less distinctly Japanese. It was followed by 300 years of conflict, both religious and political. (4) The political peace and national unity which were restored at the beginning of the 17th century brought peace to religion. But the peace was kept by artificial means—by political oppression. This period, on the other hand, gave rise to Confucianism and the revival of the national Shinto religion, while Buddhism slumbered for a long time. (5) The revolution of 1868 shook off all the artificial restraints that had made for peace. The religious sentiment is now growing, and is in a state of ferment, the new element of Christianity having been added and Buddhism reawakened.

Through all these vicissitudes, no Japanese religion ever organized a firm, exclusive national church. Nevertheless, protection by and interferences on the part of the government and the ruling clans always affected the relative positions of the various religions. Every prominent religious body enjoyed, more or less, a kind of state patronage. Thus the ambition to secure the privilege of being sanctioned and

protected by the rulers was responsible for the chief effort of many a religious leader. But the toleration of various religions and the many attempts at compromise have been characteristic of the whole history.

I. Prehistoric Religion (before circa 550 A.D.).—The prehistoric religion of the Japanese consisted in the worship of the *kami*, or spirits and deities. It is usually known by the name *Shinto*, or The Way of the Kami, but it was not an organized observance or teaching. Both the appellation and the attempts to systematize it are post-Buddhistic. The belief in these kami, whose respective functions and relations to one another were not quite definite, and the simple rituals intended to invoke or to propitiate them, made up the whole of the religion. Anything which seemed to the uncultured people unusual or mysterious was believed to possess a spirit, either benignant or malevolent, or both. Some of the kami were thought to be residing in heaven, and others sojourning among aerial phenomena, natural objects or living beings. Men are, or may become, kami by the manifestation of extraordinary powers.

Though there existed no definite theogony and no clear cosmology, a certain system of mythology may be traced. In the primeval chaos, we are told, some pairs of deities were generated spontaneously one after another. All these seem to have represented productive powers, and the first of them, the High-Producing (*Taka-mi-musubi*) and the Divine-Producing (*Kami-mi-musubi*), are invoked constantly. The last of these pairs, the Male-Who-Invites (*Izana-gi*) and the Female-who-Invites (*Izana-mi*), generated the islands of the Japanese archipelago and the several objects of nature, which are all called kami. But of the male alone were born the two most important deities. One is the Heaven-Shining Deity (*Ama-ter-asu*), the goddess of light and culture, and the other the Swift-Impetuous (*Susa-no-wo*), the god of darkness and outrage. The heavenly kami clustered around the former and they drove the latter into exile. The malicious spirits, on the other hand, did not make up a unified force. The contrast of these two deities, as we might expect, did not develop into a dualism, as in the religion of the ancient Persians, with which Shinto has some resemblances. On the contrary, a compromise was made of these two. They were considered to be the conjoint generators of the ruling family. This may be due to the introduction into the mythology of certain compromises between the divided clans.

Each tribe or clan had its own tutelary or ancestral deity, a hero, a personified quality of nature or a fetish. The special favor of the tutelary deity was expected by each clan, but that did not exclude the worship of other kami in case of need. The Heaven-Shining, the progenitrix of the ruling family, is accompanied often by her noumenon, the High-Producing Deity, who follows behind her. On the other hand, the Great-Land-Master and the Renowned Dwarf, the offsprings of the Impetuous, appear as formidable spirits and were worshipped without regard to clan distinctions. But the general tendency of the religion, near the dawn of history, was toward the supremacy of the Heaven-Shining Deity, built upon the basis of an indiscriminate worship of various deities and spirits. The preponderance of the Heaven-Shining Deity and the growing power of the ruling family co-operated with each other.

Curiously enough, in spite of the belief in the spirits and in the ancestral deities, the ideas about the human soul and its future conditions were rather vague. There was a kind of Hades, the Land of Gloom (*Yomotsu-kuni*), and also the Heavenly World. Not every one, however, was expected to go to either the one or the other after his death. The soul was believed to be composed of two parts, the one mild, refined and happy, and the other wild, raw and raging. The latter manifested itself separately from the person to whom it belonged, even to his own astonishment. Whether every deity or human being was believed to possess these two, or powerful persons only, is not clear.

The ritual of a religion like this was naturally quite simple. The deities were worshipped in their abodes, in simple buildings or as inhabiting natural objects. There were no images but only representations in mirrors, and in other objects. The offerings consisted of raw foods, drinks, cloth, etc. Prayers were recited or rituals performed before the sanctuaries. The Harvest and the Feast of the Purification, the latter of which was celebrated twice a year, were the greatest festivals. Spells and divinations were known but were not elaborate. The divine efficacies of the objects connected with the rituals were believed in and made use of mostly against evil spirits. Priestly families existed but the priestly practices were not limited to them.

II. The First Period of Buddhism in Japan (circa 550–1200).— Constant communication with the continent brought various arts to the islands, one after another. The introduction of the Chinese writings gave the people some acquaintance with reading and writing, and possibly the aspiration for a higher civilization, but scarcely any religious influence. In 538 (usually but erroneously ascribed to 552) Buddha's religion, represented by his image and some scriptures, was presented to the imperial court by King of Paikchoi (a state in Korea) as the sign of homage and friendship. The existence of a kami called Buddha, who was said to be infinite in his power and wisdom and who was represented by a fine image, unknown before, was an amazing revelation to the court people. Some of them, who had probably been worshipping the deity before, were in favor of receiving the presents, but many others, who adhered to the worship of the national kami, were against it. The conflict was involved with political and clan strifes. It lasted 50 years, during which time the new worship was supported by the efforts of its missionaries, by works of art and also by some alleged miracles. The fall of the conservative party and the ascending of Prince Shotoku, the Constantine of Japanese Buddhism, to the regency decided the final issue of the struggle. The Three Treasures (Buddha, his Law and his Church) were proclaimed as the ultimate foundation of the national faith. Temples and monasteries, side by side with asylums and hospitals, were built. Priests and artisans immigrated in throngs. The Prince himself gave lectures on the Buddhist scriptures. We owe the oldest Buddhist

writings to the Prince and the works of art to Buddhism under his reign.

Buddhism brought new ideas, that of the spiritual communion with the Buddhist saints and of the birth in Buddha's Land. But the most influential factors of the Buddhist propaganda were the activities of artists and missionaries. Through the channels of arts and industry they began to refine the sentiment of the people and to promote their welfare. At any rate, it was an overwhelming power, incomparably more powerful and appealing in every respect than the pristine faith. The civilization of Japan made a leap by embracing the Buddhist religion, but at the same time the spontaneous development of Japan's own religion was arrested.

During the 200 years following this decisive step, the missionary zeal and the activities of Buddhist priests were indeed admirable. Their influence soon made itself felt in the provinces. Roads were built, rivers bridged, mountainous regions made passable. The influence of Buddhism progressed steadily. The greatest patron of the imported religion was always the one who occupied the Imperial throne. The idea was that the tranquillity of the country and the security of the throne depended upon the favor of Buddha and his celestial attendants. Thus temples built were dedicated to these supernatural guardians, and the manuscripts of the sacred texts were distributed in the provinces in order to secure the benefits of the celestial guardianship. But this was not a merely superstitious idea. Constant distribution of medical materials and the sending of physicians accompanied by preachers to the provinces must have been received by the people with great gratitude, both toward the religion and the government. We can imagine also how the provincial cathedrals impressed the people's mind with the dignity of the Imperial court and of the Buddhist hierarchy.

The progress of Buddhism culminated in the foundation of a central cathedral near Nara, the capital. It was dedicated to Lochana, one of the spiritual bodies of Buddha, and on the occasion of the thanksgiving for the first discovery of a gold mine in Japan (749), the sovereign (Shomu) himself bowed before the gigantic statue of the Buddha, declaring himself to be the Servant of the Three Jewels. The Empress was no less eager in showing her piety. Works of charity were instituted by her. Buddha, in the disguise of a sick man, is said to have been cured by her in one of her hospitals. These examples were imitated by nobles, and much wealth was lavished on the pious cause.

Even under this marvelous progress of Buddhist influence, the old faith in the kami kept its hold firmly on the people. The construction of the central cathedral was completed primarily on account of the oracular sanction given by the Heaven-Shining Deity. The alleged sanction was based on a conciliatory explanation that the Deity herself was a manifestation of Buddha. This compromise gave a stimulus significant for the further development of Buddhism, both to its gain and loss. The step became once for all a typical model of the further amalgamation of Buddha's religion with the old worship. The compromise was a natural outcome of the Buddhist propaganda which was largely carried on by the means of outward splendor and the idea of immediate helpfulness. Of course, these were aided by the teaching of Buddhist philosophy and by moral disciplines, both of the monks and of the laymen. But this wisdom and morality, on the one side, and the ideal of salvation, on the other, were rather loosely connected. The rebirth in a heavenly world, rather than the ultimate enlightenment, and in addition, the worldly benefits which the religion afforded, were the chief attractions.

This circumstance furnished the reason for the religious arts of this period — chiefly mural paintings and sculpture. The Buddhism adopted by the Japanese was, first of all, a religion referring constantly to beauty. The classical period of Japanese sculpture, which has never been excelled by the later ages, was the result. It is perhaps needless to state how Buddhism refined the æsthetic sentiment of the people by its arts, gave a stimulus to the building of more lasting abodes by its architecture, and made firmer the social organization by the help of its hierarchic institutions.

The removal of the Imperial residence from Nara to Kioto in 794 marked a parallel change, not only of the chief seat of Buddhism but in its doctrine also. One monastery on a hill near the new capital, known thence as Hiei, and a temple in the town were founded under Imperial patronage. The two most conspicuous personages in the history of Japanese Buddhism, Saicho (whose posthumous name is Dengyo, 767–822) and Kukai (posthumous Kobo, 774–835), were despatched to China in 804. This opened a new path for Buddhism, and they started a new departure. The religion of these two was characterized by its elaborate system of mysticism, most probably a form of Buddhism mixed with Hinduism and Persian Magism. Here doctrine and ideal, philosophy and religion were more closely connected than in the Buddhism of the preceding period.

Dengyo's teaching was founded upon the Buddhadology of the Lotus of Truth the Johannine Gospel of Buddhism, so to speak. In it the personal Buddha was revealed in his real, though quasi-historical, and spiritual aspects. The historical Buddha, the revealer of the Way to Truth, is at the same time the Truth itself. These two aspects of Buddha's personality, together with his manifestations to believing spirits of all possible varieties, make up the Buddhist Trinity. All the practices of virtue, meditation, mysteries and the wisdom of philosophy are, with Dengyo, to be concentrated in the belief in the trinitarian Buddha. Though the mystic side was the chief source of the influence which Dengyo and his successors exercised upon the court, other sides of his religion were cultivated in his monastery on Mount Hiei. In this way the hill monastery became a centre of Buddhist religion and learning and several branches of the later Buddhism flowed out of this fountain.

On the other side, Kobo's Buddhism loses sight of a personal Buddha in the mist of a mystic pantheism. It was a curious combination of phantastic idealism and extreme materialism. The mystic practices founded upon this doctrine became the chief attractions both to the court and the people. Kobo's ingenuity and zeal gradually overshadowed Dengyo's in-

fluence and many of the latter's followers found it more useful to emphasize the mystic side of their master's teaching. Thus the Japanese Buddhism of the four centuries from the ninth onward was chiefly a religion of mysteries.

During this period the growing centralization of the government and the splendor of the court life, on the one side, and the hierarchic system of the two centres of mystic Buddhism, on the other, helped one another in their growth. Buddhist ceremonies became the order of the day in the court. Sermons and sacraments in numerous temples were attended by throngs, both of the high and low in rank. Bishops and abbots became dignified nobles, exercising their influence upon affairs, political and military.

Still care must have been taken of the kami of old. The amalgamation of the kami-worship with Buddhism went on. While Dengyo's attempt on this line was not quite successful, Kobo's mystic pantheism was just fitted for embracing the old deities into the Buddhist pantheon. The Ryobu, or syncretic, Shinto now came into vogue. Every Shinto sanctuary was attended by Buddhist priests and their rituals were a mixture. But as the Shinto belief was affected by Buddhism, so Buddhism was to a great degree influenced by the Shinto religion. We can speak of a systematized Shinto as existing after this time, and the syncretism continued till the Restoration of 1868.

The sway of the mystic Buddhism, however, was not limited to the external aspects of religious exercises. In the midst of solemn ceremonies and the luxurious splendor of the court life, the evanescence of worldly things was felt and the aspiration for an eternal bliss become conspicuous. The people, who had long since ceased to be naïve children of nature, were led to the conscious consideration of the problems of human life and to self-introspection. Side by side with painting and sculpture, literature imbued with Buddhistic sentiment became a great influence. Romantic sentimentalism, combined with an uneasy spirit, marks many romances of the latter part of the period. Thus a current of disquieted and aspiring emotion was flowing under the external brilliancies, both religious and social.

III. Religious Agitations (1200–1600).— The above-mentioned current finally manifested itself in a powerful way, when the Fujiwara clan, which furnished the sole directors of the flourishing court life and the ruling political forces, was overpowered by the military clans. Political and family strifes in the middle of the 12th century brought the weakness of the court to the light of day. To the place of the Fujiwara nobles the military clan of Taira succeeded. But this latter enjoyed only 30 years of luxurious life and was crushed by the Minamoto clan (in 1185). Instead of the refinement and luxury of the preceding rulers the Minamoto rule was a stern militarism, and they ruled the whole country with their headquarters in an eastern province. This momentous change, though long since prepared for, impressed deeply the people in the capital and the western provinces. Cherry blossoms in full bloom were dispersed suddenly by a frosty storm. Not only the poets felt so, but all the people saw the change actually take place before their eyes. It was not a mere political revolution. The Buddhist hierarchy lost its power together with its political supporters. The people's longing for a simple and appealing faith was no longer satisfied by elaborate mystifications and gorgeous rituals. The result was the rise of pietism.

The germ of the pietist faith had been, for a hundred years, fostered in the monasteries belonging to Hiei. Faith in Amita the redeemer in the Western Pure Land (Jodo, or Sukhawati) had its propagators in several writers, painters and itinerant preachers. The time was ripe for its rise; sentiment and aspiration demanded it. Its coming into power was signalized by Honen (1133–1212), the promulgator of the faith in the turn of the 12th and the 13th centuries. Honen opened the only gate of salvation that all might enter by a simple and devout faith in Amita's redeeming power. Amita's grace, into which we can be taken by invoking his name, was the gospel he brought forward to the salvation of himself and all those who would follow his faith. Conversion in masses took place; conversion of the nobles and courtiers amazed by the sudden decline of the court splendor, of the military men disgusted with their barbarous pursuits, of the common people long since dissatisfied with the mere outward forms of religion. His saintly personality with his simple gospel of salvation was indeed a revelation of the serene light issuing from the Western Land of Bliss.

Honen was succeeded by many able disciples. One of them, Shinran (1173–1262), popularized the faith by still more appealing doctrines. He disregarded the signs of Amita's grace, the abundant repetitions of the Buddha's name; he also abolished the prohibition of the marriage of priests: all in contrast to his master. Not "virtues" but "faith" was his sole watchword. This was quite a new phase in the history of Buddhism; Shinran's religion (now called the Shinshu, or True Doctrine) continues to this day to be the most influential in Japan.

The pietists were followed by a prophet. In the first half of the 13th century Kublai, the Mongol Emperor, subdued nearly the whole of the Asiatic continent, and his army and navy began to threaten the Island Empire. Great were the fear and the commotion throughout the country. Nichiren (1222–1282), the prophet, took this opportunity to warn the nation that it would be vanquished by the invaders, unless conversion to the true faith should take place. His faith was the orthodox teaching of Buddha, as taught in the Lotus of Truth and his tenet consisted in the adoration of the Truth by uttering the title of the Scripture, which he considered to embody the Trinity. With this cry of "Return to Buddha" and his prophetic utterance in the tone of a Jeremiah, he opposed every prevailing authority, both political and ecclesiastical. Insults followed by trials and prosecutions, only helped to strengthen his enthusiasm. At last, during his exile in a remote island, he attained the conviction that he was the Suffering Sage whom Buddha had destined for the propagation of the Law in the latter days of the world. After this, in a retirement of eight years, his thought was occupied with the spread of his Buddhism from Japan to the whole world. Though his dream of universal religious unity remained unreal-

ized, his prophetic zeal and his patience in suffering were emulated by his disciples.

To the awakening of faith in various ways another new feature was added by the introduction of Zen Buddhism. Eisai (1141–1215) and Dogen (1200–1253) were its agents. They differed in the transmissions of the method and in the characteristics of its practice, the former's being mystical and the latter's practical. But both taught a simple and direct method of emancipation from worldly troubles by practising Zen (Dhyana) or meditation. The method is characterized by the absence of dogmas and consists in simply striving to realize one's own inner self. There the practitioners are taught to arrive at Buddha's wisdom which is coeval with reality. But reality does not exclude phenomenality. When once the innermost self is realized, everything, though seemingly ephemeral and offensive, becomes resplendent with bright rays of eternal light. It was quite natural that this simple method converted many warriors. The Buddhism of temples and rituals was substituted by that of the fields and camps.

In the pietism of Honen, the revivalism of Nichiren and the intuitionalism of the Zen practice, Japanese Buddhism attained its own standpoints. These new departures, which were concomitant with the growth of national sentiment influenced the life of the nation in every respect. Visions of the blissful superhuman existence, resulting from pious faith, or nature and landscape in their appeal to serene meditation, became the theme of paintings. Rhapsodists recited the rise and fall of the contending clans with many episodes in which figured the men and women who were saved from sorrow and agony by faith. Religious teachers wrote their epistles and hymns in simple yet powerfully appealing Japanese, in contrast to the dogmatic treatises of the preceding period, written in Chinese. Monasteries and mansions, hermitages and cottages came to have closer touch. Popular education instead of profound philosophizing; counsels and services relating to daily affairs instead of mysteries and rituals; these were the instruments of the propaganda. Tea, fans, kakemono, caligraphic drawing, Japanese smile, the sternness of expression, everything now known as peculiarly Japanese is the product of these influences, directly or indirectly.

The firm and peaceful government under the military dictatorship which lasted over 100 years in the 13th century, was followed by political disintegration. The Age of Wars lasted from about 1330 to 1600. It was also the age of religious conflict. The followers of Shinran increased rapidly throughout the country. They organized an almost extra-territorial church, with the abbot of Hongwanji (their central temple) as their head. The old centres of Buddhism on Hiei and other mountain temples were occupied by armed bonzes. The missionary zeal and fervent attitude of Nichiren's followers everywhere encountered bloody resistance. Religious bodies and orders became militant and fought not only each other, but feudal lords also. In the midst of this confusion minor sects arose. Every possible idea and practice found its promulgator and followers. It was the Zen monasteries that cared for the preservation of literature and the cultivation of useful arts during this time.

Some attempts were made at organizing the Shinto religion which had almost been absorbed into Buddhism. Chikafusa (died in 1354), the patriotic court noble, tried to combine Japanese mythology with Buddhist cosmology and in that way to explain and confirm the divinity of the sovereigns. He became, in this latter respect, a forerunner of the nationalistic Shintoists of the 19th century. A family of diviners, Urabe by name, and its chief representatives in the 16th century founded a school of Shinto, called the Unitarian Sect (Yui-itsu), in antithesis to the syncretic or double Shinto. But in reality it was a combination of Dengyo's Buddhism with several alien ingredients. In their writings, profound philosophical sayings are found side by side with curious explanations of mystic practices. Another branch of Shinto was found in the 16th century, though its completion dates from the next century. It is named the Geku-Shinto, having been organized by the priests of the temple Geku, a counterpart of the shrine dedicated to the Heaven-Shining Deity. The system was much imbued with Confucianistic elements, not in moral teachings but in cosmology and divination. All of these priests who formulated doctrines were voluminous writers, but their influence was not great.

The agitation was increased by the unexpected arrival of the Jesuit fathers in the middle of the 16th century and by their amazing success, which was partly due to the fire-arms which their countrymen imported. Some feudal lords got the new fighting instruments together with their new faith. They fought their neighbors with the help of the rifles; temples and shrines were devastated. The rise of the Jesuit propaganda culminated in the establishment of a central cathedral in the capital (in 1568) under the patronage of Nobunaga, a feudal lord who then ruled in the capital. Nobunaga was a mortal foe of the Buddhist soldier bonzes and fought them incessantly. It was his religious policy to welcome the new religion. The converts numbered at that time nearly 300,000, among whom there were not a few feudal lords. But the turn of their fate began with the death of their patron in 1582. His successors endeavored to expel the missionaries and the obstinate converts from the country. The last blood of the martyrs was shed in 1638, when the stronghold of the Christian insurgents was crushed. Unexpected as was their arrival and amazing as was their success, the Jesuit fathers disappeared from the country like a comet. Their name corrupted into Japanese "Kirishitan Bateren" (Christian Padres) alone remained, inspiring something awful in the minds of the people even until recent times. Nevertheless, a group of humble fishermen near Nagasaki have remained attached to their Christian faith in secret, through over 200 years of strict inquisition. Their faith has been revealed since the revisiting of the Catholic Fathers in the 19th century.

The period which had a glorious start of religious awakening ended thus in a miserable absorption of religion into politics and battles. Nevertheless the beliefs sown in the heart of the nation still remain and may grow up again.

IV. Peace and Stagnation (1600–1868).—The complete extinction of Christianity was

synchronous with the firm establishment of the Tokugawa Shogunate. The new régime put an end to the age of warfares, both feudal and ecclesiastical. The policy of the new government in regard to religion was to keep, strictly, the status quo of the various branches of Buddhism and to guard against any rise of Christianity by means of the religious census entrusted to Buddhist priests. Each Buddhist body was allowed self-management but no change of area of jurisdiction was allowed. The state churches, so to speak, were richly patronized by the authorities. Stagnation began in ease.

Another remarkable feature of the state management was the establishment of an orthodox Confucianism as a system of moral instruction apart from ecclesiastical institution. The orthodoxy was founded upon the writings of Chu-hi, a Chinese philosopher of the 12th century. Obedience was the first and last of his teaching, and this was the best suited to the intention not only of the central government, but of the feudal states, all of them now eagerly seeking to keep peace and to establish order. The Samurai (comprising the warrior and ruling class) were trained in the orthodox moral teaching. The morality of faithfulness, stern justice and rigorous self-discipline combined with the code of honor, which had been fostered among the Samurai during the long Age of Wars. These made up the Bushido, the way of the Samurai. See THE SAMURAI.

The establishment of the orthodox teaching had two kinds of consequences. One was the general indifference of the Samurai class toward religion, and a feeling of antipathy toward Buddhism. Though Confucianism was not destitute of cosmological and philosophical speculations, its centre of gravity fell on practical morality. Self-discipline, domestic management and state government were the cardinal interests of its teachings that were now adapted to the orthodox teaching current among the Samurai. A positivism and a Stoicism like this is necessarily an opponent of religious faith. Thus Confucianism, which had been transmitted chiefly by Buddhists, now became their opponent. Buddhism incurred an antagonism for the first time in the history of its existence in Japan, from an orthodox Confucianist in the middle of the 17th century. His example was followed by nearly every Confucianist of subsequent years. This anti-Buddhistic tendency among the Samurai class raised its voice most at the time of the Restoration and is felt even to-day.

The other consequence was neglect of the moral training of the common people and contempt for the merchant class. Not only was the moral code of the ruling class incapable of refining the people, but it was more convenient for the rulers to keep them as blindly obedient servants. Husbandry was regarded as the only source of wealth, but husbandmen were mere producers. Trade was thought a treacherous occupation and merchants were treated as base, contemptible people. It was quite natural, in this condition of society, that general education was left in the hands of poor schoolmasters who taught reading and counting only, or at the mercy of Buddhist priests, who became more and more corrupted in conditions of ease and security. To meet the need there arose, in the middle of the 18th century, an ethical movement which was humanitarian in its spirit and popular in its practice. The movement is known as the Shin-gaku, or mental learning, which means the culture of the mind. The teachers of this popular education were men of admirable character, their teachings were quite broad and plain, and their lectures and writings were persuasive in tone, attractive and intelligible to all. The movement flourished, and continued to have great success up to the end of the Shogunate régime, when its quiet and meek character no longer fulfilled the need of the new reign.

Buddhism enjoyed, as the patronized religion, a peaceful slumber during this period. But its activity never totally died out. It was during the peaceful times that most of its writings were printed, and that, a thing more important, the dogmatic system of each of its sections was organized, so that in form it reached the utmost refinement. Strifes of orthodox teachers of dogma with heretics were characteristic of Buddhism at this period. Appeals for decisions were often taken to the government and many tragi-comedies were played by the meddling of the officials with subtle dogmatic discussions. Curiously the Shinshu men, the followers of the pietist reformers of the 13th century, were foremost in these struggles.

Among the Confucianists appeared many men of more or less original genius, more of them outside the orthodox circle than within. Their struggles with the orthodox teachers and also among themselves were so severe that the government at last found it necessary to prohibit the heretical branches. Still they made common cause with the orthodox men in their attitude against religion.

To these opponents of Buddhism was added a new factor, i.e., the revival of Shinto. The first section of the revivalists was composed of learned Confucianists and Samurai. Their creeds amounted to obedience to the heavenly reason and to its practice in loyalty and filial piety. Loyalty, not only to the feudal lords, but to the imperial throne, and filial piety, chiefly expressed in ancestor-worship, made them advocates of the Shinto belief. Thus the orthodox Confucianism adopted by the Shogunate government became one of the factors which threw down the existing régime and restored the imperial authority. The second section of the new Shintoists were Japanese philologists. Studies of the ancient mythological and historical writings, the first impetus to which was given by a Buddhist monk, were now used for the revival of the ancestral religion in its ancient and pure form, at least such as these philologists thought it had been. Indeed, their Shinto was free from Buddhistic and Confucianistic elements, but the most prominent of them, Hirata (died 1843), was already influenced by European learning. These men and their followers contributed to the restoration of the imperial régime and influenced the religious policy of the new era. But their religious influence was not deep.

Another remarkable feature of the Shinto revival was the appearance of some theistic Shintoists during the last century of this period.

They considered themselves Shintoists and they are called so. But in reality their beliefs were loosely connected with ancient traditions. They were men of original religious experiences, almost visionaries. Kurozumi (died 1849), the most prominent among them, can be called a propounder of almost pure monotheism in a very simple and devout form.

V. The New Era, Progress and Problems (1868—).— The new era opened with the restoration of the imperial authority in 1868. Chauvinistic Shintoists and Confucian samurai, both prominent agents in the political transformation, tried at once to establish a national religion. The National Cult Department stood at the head of the new government and every means was taken to exclude Buddhist influence. All the privileges granted to Buddhist priests and temples were abolished. Buddhist were driven out of the kami-temples that they were attending; images, decorations, scriptures etc., were taken out and burned. Even cremation which had been introduced by the Buddhists was prohibited. The purification of the national religion was carried out, after 1,200 years of its mingling with Buddhism. The establishment of the Shinto faith as the state religion was fatal to Buddhism in its material aspect, but this loss was to be compensated by its spiritual reawakening. The zeal of the Buddhists, combined with the unstable social conditions after revolution, influenced the government to the extent of instituting an Ecclesiastical Board, under the supervision of which both Shintoists and Buddhists could preach the "patriotic and humanitarian principles" as the authoritative teaching of the state (1872). The two religions now stood on an equal footing. After three years the board was dissolved. Buddhist churches were allowed their respective independent management, and Shintoists were ordered to organize their own bodies apart from the court ritual. The fervent Shinto revival subsided, after a few years' sway, and the freedom of belief was pronounced *de facto*.

The same year (1875) witnessed an event decisive for the progress of Christianity. This was the return of Neeshima from America and his founding the Doshisha Theological School. Prior to this, the prohibition of the Kirisitan Bateren had been withdrawn (in 1872). Young men converted to the Christian faith gathered themselves together in several towns, with a high aspiration — to enlighten themselves and their countrymen. Firm in their belief, they had withstood the effects of the suspicion and hatred of their neighbors and the threatening of their Samurai fathers. Now these enthusiasts found their leader in Neeshima. The opening of the campaign for the Gospel at the beginning of the new era was a bright one and its rapid progress up to the end of the eighties was astounding. The amount of the educational works produced by Christian mission schools during these years can never be overestimated. The moral ideas which Christianity has sown are now bearing fruit, especially in the matrimonial relations. Side by side with the Protestants, the works of the Roman Catholic and the Greek Orthodox missionaries progressed steadily among the lower classes. The Christianization of the whole nation had once seemed not to be a mere dream. But this was a surface current. A parallel current of agnosticism and a hidden one of reaction once more manifested themselves.

The Samurais, who had once been against the opening of the country to the "foreign barbarians," ran to the other extremity after the Restoration. Everything European or American seemed to them to be the best. Together with railroads and telegraphs, Rousseau, Mill and Bentham were welcomed indiscriminately. The rapid progress of Christianity, especially Protestant, was partly assisted by the Europeanizing tendency of the time. But the nationalistic ideas never died out. When, toward the end of the eighties, problems of the treaty revision with foreign powers gave rise to anti-foreign feelings, reaction made itself felt in the religious sphere. Buddhists were foremost in the anti-Christian movements. All conservatives, many of whom were Shintoists or Confucianists, gathered under the banner of a "Buddhistic Patriotic Union" or of an "Association for the Establishment of the National Religion"— which they called "The Great Way uniting the Three Religions." They forgot their former antagonisms and joined hands, simply to oppose the foreign religion. They were also aided by young Buddhists who had studied Western philosophy and who fought Christianity with Draper, Renan, Spencer in their hands. Thus we see here a curious alliance of conservative reaction with agnosticism, the sciences and Indian philosophy. Indeed the Christianity which prevailed at that time deserved these attacks. By many of the converts it was accepted because it was the religion of the Westerners, who were inventors of the locomotive, or who spoke the "enlightened English language."

The combined reaction was followed by more clearly nationalistic ideas. In 1890 an imperial rescript on the national code of morality was issued. It was founded upon "the teaching of the Imperial Forefathers" and aimed at the unification of national morality. These features of the edict were made use of by some thinkers as the weapons to be used against Christianity and later against religious faith in general. The war with China in 1894–95 gave a momentous impulse to the rise of the national consciousness and to the reawakening of the Samurai spirit. The educational circle that never allowed religious influence to come into it, and which was composed mostly of Samurai's sons, advanced from the attack on Christianity and Buddhism to the attempt to dictate to the nation's conscience an authoritative principle. Shintoists now separated from Buddhism. Though the attempt to organize a propaganda of the nationalism failed, the ideas represented the creed of the majority of the educationists.

The religious problem of New Japan was now translated from the differences between the old and the new, or between Christ and Buddha, to the antithesis between religion and non-religion. Whether there is to be a religious faith or a mere moral teaching; this has been the point of the dispute since that time. Soon after the outbreak of the dispute a meeting of leading Buddhists and Christians in friendly terms was held (in 1896). Some of the addresses given at the meeting pronounced the hope that the followers of Buddha and of Christ might join hands against their common

foes, the advocates of irreligion. The meeting marked a turning point in the religious problems and became the predecessor of the present Religious Union of Japan.

While a group of educationists was trying to invent a substitute for religion and religious leaders were looking for a new opening, the people were left to themselves. Most of the Buddhists sects were engaged in internal struggles. Buddhist teachers themselves were destitute of faith; neither their old traditions nor the newly allied philosophy was able to give them vitality. Some Shinto sects were founded or revived. Most of them had little to do with the nationalistic Shinto, but they represented various shadings of popular theistic religion. The most influential of them, the Tenri, or the Heavenly Reason, teaches that there is a sole Supreme Divinity and preaches absolute faith in Him. But these beliefs are mingled with superstitious practices and obscure cults. These dark sides became manifest when economic panics after the war were manifested by a general emotional depressioin. At the same time religious needs among the younger generation began to expess themselves in the two extremes, scepticism and sentimental pietism. There arose many unions of young Buddhists with various affiliations ranging from rationalism to revivalism. Christian churches began anew to be thronged by young seekers after faith. The increased publication of religious essays and books of devotion, both Buddhist and Christian; new editions of the writings of ancient Buddhist teachers; the organization of religious and philosophical lectureships; these signs showed an urgent demand for faith and truth. The seeking was naturally accompanied by uneasiness and disquietude of head and heart. The general dissatisfaction with the prevailing forms of religion and ethics gave opportunities for the rise of several extreme propositions and theories. Tolstoi, Nietzsche, Leopardi were often referred to. These disharmonies marked the turning of the century and in the midst of the struggles and conflicting influences the war with Russia (1904–05) broke out.

The religious and moral struggles which seemed to have subsided during the war became again prominent soon after its close. Adoration of the way of the Samurai and pleading for the ancient patriarchal system, ancestor worship, etc., followed the celebrations of the victories. Militarism is getting more hold in education. Side by side with the advocates of these reactionary ideas there appeared some who alleged that they had seen in vision, God or Buddha, and some prophets who pretended to be revealers of new truths.

In the religious movement of contemporary Japan three points are to be noticed: (1) The conservative reaction amounting to the advocacy of the national Shinto religion, in conjunction with the patriarchal system of the family; (2) the revolting spirit among the younger generation, their radical individualism and spiritual disquietude; and (3) the problems concerning the relationship between Buddhism and Christianity, including the question of adjustment of the latter to the genius and the needs of the nation. The first of these stands in a close connection with the political reaction against the constitutional or democratic régime; and the co-operation of the conservative politicians and the educational authorities is endeavoring to dictate to the nation's conscience a moral code, which is national and secular and therefore anti-religious in principle and applications. This has ever been a powerful factor in the religious and moral movement since the nineties of the last century, but its influence or coercion is now being sharpened in reaction against the rising radical tendency, combined with spiritual aspiration and uneasiness of the individual. The disquiet and yearning spirit of the individual, especially among the rising generations, does not know wherein its course should consist, and consequently runs easily to an extreme of revolting spirit against anything traditional or authoritative. This critical situation is aggravated by the social unrest caused by the rise of industrialism, the consequent uneven distribution of wealth, the pressure of the rapidly increasing population, and more especially by the bewildering conflicts of religious and ethical ideas.

This last aspect of the present situation is chiefly a consequence of the deficient vitality of Buddhism and of the retarded progress of Christian propaganda, in short of the weakness of religious influence at large. It is a question whether Buddhism could revive its edifying energy, but it is certain that the religious question of Japan cannot be solved without taking into account the deep-seated heritage of Buddhist influence. On the other hand, Christianity is facing grave problems of how to adjust itself to the genius and needs of the Japanese, as well as of how to face the anti-Christian or non-religious ideas introduced from the West into Japan. The question of Buddhism *versus* Christianity is being shifted to that of religion *versus* non-religion, or in other words, of universal ideal *versus* national ethics. A light may, however, be discerned in the cordial relationship and mutual understanding between some leaders of the two universal religions existing in Japan, and in their co-operative attitude toward various religious and moral problems of the day.

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12. JAPANESE LANGUAGE, The. No vital affinity with any other language has been demonstrated for the Japanese, though in its structure it may be grouped with the Uralo-Altaic tongues, in which are the Korean and Turkish. By the late Mr. Hirai much labor was spent in showing its close relation to the Aryan stock, while the apparent identity of many of its roots with those of the Hebrew was proved by the late David Thompson, one of the long line of American scholars who have

furnished keys to the treasures, and bridges to the mastery, of the colloquial and written language; in the public spoken use of which, in Japan, Americans have notably excelled. Previous to contact with China, whence writing was borrowed, the old Japanese language, or "Yamato dialect," was as relatively free from Chinese elements as was the Anglo-Saxon previous to contact with the Romans. The ancient Shinto rituals and the classic literature (ante 1200 A.D.) are expressed in this archaic tongue. The written language is much more closely allied to ancient models and idioms, differing from the modern colloquial fully as much as Latin does from Italian, while also the daily talk of the plain people is in notable contrast to that of the modern educated man. One finds also that the speech of the native women approaches a standard of purity unknown among the men. From the 6th to the 19th century the Japanese borrowed wholesale from the Chinese, mostly in vocabulary, though even idioms and the structure of many sentences have thus been modified. In this way the volume of the original language has more than doubled, the additions filling large dictionaries. Yet since 1860, through the coinage of new terms transferred from the Chinese and the combinations of ideographs made in Japan, the repertoire has been immensely enlarged. A Japanese of, say, 1850, could not make much of the book and newspaper language, or even the conversation of well-bred men of to-day. The classic style is much in vogue for books, correspondence, advertisements and legal documents, though a mixture of both styles is preferred. The softer speech of the female part of Japan has little to do with sex or cultivated charm, but is to be ascribed rather to the greater use of their mellifluous native tongue in its comparative purity and extreme richness of vowels and liquids. The men make a large use of Sinico-Japanese, or words derived from the Chinese, very much as we employ terms which, by the thousands, are borrowed from the Latin or Greek. Yet no Chinese can understand even the vocabulary of spoken Japanese, for the two systems of pronunciation are both old and of course modified by long use in an alien country. The first (Go) was imported from southern China a thousand years ago, when Nanking was the capital. The more modern (Kan-on) was brought from North China, when Peking was the chief city, meanwhile suffering change in Japan; while also both systems were and are used. The differences between Pennsylvania "Dutch" and modern German and "Mohawk" Dutch and the Holland tongue of to-day suggest parallels. The kana, or syllabary in use, can only partially express foreign sounds. Hence, for example, the rendering in the native newspapers of the candidates (there being no *l* in Japanese), Blaine and Cleveland (Buraine and Kureburando), or of the English name, Longford, as Ronguwanudo. When the Japanese borrowed letters from the Chinese, who had no alphabet, they in time, and traditionally under Kobo Daishi (774–835 A.D.), invented a syllabary of kana, or side letters containing 47 characters. This, with diacritical marks, now includes 73 signs, of which 68 are used and is written in two forms, the square (*kata*) and the round or curved (*hira*). Though always despised by the scholars, this writing is much used by the common people in the popular books and newspapers to give the sound of the less known Chinese characters, fresh coinages of pen and brain and foreign names and places; much as we, in our dictionaries, make visible and potentially audible the pronunciation especially of uncommon, new or foreign words or names. The foreign student, therefore, attacking Japanese for mastery must really learn three languages in one. If to this he would achieve power to write it fluently and exactly, he must learn a script that foils a Chinese and means the attainment of from two to six thousand signs expressed in the books and in four or five styles of script. Nevertheless the task set before native children, who grow up in a home and social atmosphere created by centuries of Buddhism, Shinto and Confucianism, with an environment of native tradition, necessity and custom, to which the adult foreigner is as a babe, has been greatly exaggerated by outsiders. So also has the impersonal and honorific elements, which are part of the common life of all, but which, when rendered with senseless literalism by an alien, are caricatures. To use the words "august," "honorable," etc., in constant repetition, as foreigners usually do in trying to reproduce Japanese honorific speech, comes as near to reality as does "pidgin English" or the "Yokohama dialect" to the correct standard of language as used by either a Japanese or an American gentleman. As an instrument of thought for use in the modern world, the language of Nippon has marked limitations and defects, but for daily use at home, easy conversation, ordinary human intercourse and in some notable lines of expression that reflect nature's reality, influencing the national history, tastes and temperament, it is unsurpassed. Prof. E. W. Clement, an American, long resident in Japan, gives his verdict thus: "The Japanese language is involved, complicated, impersonal, neutral, obscure, but also pretty, musical, logical and polite. Some Japanese argue stoutly for the superiority of their language in stating first the substantive of the main object or theme and the action concerning it afterward. For example, we say in English, "see the moon," but in Japan, "the moon see." The patriotic subject of the Mikado argues that the moon was first and man next, the visible object being prior to the act of seeing. So also one word for house is ya-ne, or roof-root. This is because, in Japanese house building, the very heavy roof is made first of all (to secure the structure against earthquake shock, which passes usually before the possibly destructive motion is communicated to the structure, the top weight holding the whole secure) and the rest of the edifice is made to fit the roof. So with hundreds of words, which hold and reproduce the race-memory and state the actual fact, which seem strange to us, but not to the natives. Fundamental features of this agglutinative language are the unchangeability of the root, the precedence of the qualifying word before the thing qualified, the placing of the dependent or explanatory clauses before the main statement and of the object before the verb, with the predicate at the end of the sentence, and the general use of post positions instead of prepositions. Inflections are few or at the vanish-

ing point. The nouns have no gender, number, person and hardly any case, though the first foreign grammarians from southern Europe tried to learn and teach this language according to the framework of Latin accidence, because there are particles that suggest case. The adjectives have no degrees of comparison and there are no true personal or possessive pronouns. So much for the negative side! On the other hand, the abundance of honorifics which were developed in the feudal age of manifold gradations of society, serve admirably in lieu of pronouns. The natives experience little difficulty in addressing each other, or in dividing in their own minds between meum and tuum. One creditable feature is seen in the almost total absence of the verbal apparatus for cursing or swearing, the language also being very deficient in terms of abuse. Indeed, the spirit of the tongue of Japan has been described as "in honor preferring one another." Since also the introduction of Occidental ideas and the literary, social and political machinery of the West, with new molds of thought and channels of expression, Japanese speakers have developed a power of oratory and an adroitness in debate that has proved to be as vigorous and effective as that heard in other deliberative bodies. Many of the old words have been, as it were, born again, with a larger soul. The drama, the stage and the story teller's booth have for centuries been the home of good elocution, but the method of reading audibly in public among the Japanese differs notably from our idea and practice of rendering with expression and feeling, so as to make true interpretation of text or author. With little attention paid to closing periods, or the beginning of sentences, and catching the breath in a curious way, there seems in this mannerism little feeling or attractiveness. The same irritating defect, as we deem it, smites with disgust the ears of the teacher of English, when his pupils "read" our authors. The Japanese verb, as shown by the masterly analysis of Verbeck, has complications known, perhaps, in few other languages. It possesses a negative passive voice and also potential powers and significations which in our language are lacking, but which by an adroit speaker are very effective on the stage, pulpit or rostrum. Striking negative features are the absence of personification and the almost total disuse of metaphor and allegory. This makes the acquisition of Japanese the more difficult to a foreigner, and especially is this true in public discourse to one whose mother speech is so rich in figures, personification, metaphor and allegorical concept. One curious effect is the inability, in Japanese, to join a neuter noun to a transitive verb. No such terms as heat or cold, science or the emotions can be rendered in our way, such as "poverty drove him to drink," or "the pestilence killed thousands." The Japanese would rather say that "being poor, he was impelled to drink"; or "an epidemic raging, thousands died." It is true that they can render such expressions effectively in their own tongue, by circumlocution, or peculiar idioms, aided by particles; but, as we think, at the expense of power and picturesqueness. Hence, the real difficulty if not impossibility of the explanation of our metaphors to the average Japanese. Nevertheless there are in the native language books closely resembling More's 'Utopia,' Gulliver's 'Travels' and Bunyan's 'Pilgrim's Progress.' The pronunciation of Japanese is easy and there is little trouble from the dialects. The most notable of these are found in the Riu Kiu (Loo Choo) islands and in the northern provinces, where a hodgepodge, or *patois*, made up of words brought by immigrants from all the lower provinces is in vogue. Archaic forms are much more numerous in the south and west, which are the older seats of civilization. In a word, in the new north or latest settled portion and in the south, the oldest part of the empire, there are the greater variations. The Ainu tongue, spoken by the aborigines, in Yezo or the Hokkaido, is Aryan. Japanese writing is in its beauty of form vastly superior to our script and calligraphy is with this people one of the oldest of the fine arts and forms of culture. The use of the brush-pen, directed, not from the wrist but from the shoulder, has helped powerfully to educate a race of artists. Yet, strange to say, the sign manual, or signature, does not hold the same place in Japan as with us. Only a man's seal is accepted as legal. As compared with the inexhaustibility and potentiality of the written characters the Japanese is noted for its poverty of sounds. Its homophony—so many vocables having the same sound in the colloquial—is great; but, while endless punning is possible, it is not welcome in conversation in which elegant expressions are rather sought for, the speaker's meaning being made plain by the context, periphrasis, or the use of many "bundle words," of which we in English have comparatively few, such as "head" of cattle, "flock" of birds, etc. Herein lies another reason why the written and the colloquial forms in both vocabulary and structure differ so markedly. In the written language, no fear of misunderstanding troubles a penman, for with a separate symbol for each word—the eye, being quicker in apprehension than the ear, he can, at will, use or create new expressions or compounds. Hence also the wonderful affluence of Western technical terms and conceptions now in use, which only slowly pass from book to tongue and from learned text to common speech. Few or no professors in the universities can, without the written symbol, make their lectures intelligible even to trained listeners, while discourse in the bald vernacular, to a general audience, on an erudite theme, is impossible. Clearness is purchased only by the combined use of voice and symbol, making appeal to both ear and eye. It is possible for a Japanese, who can draw from the inexhaustible treasure of the Chinese ideographs, to render all abstract words and technical terms and every shade of meaning represented in the columns of an American newspaper or learned periodical. These borrowings fill large dictionaries while Gubbins' work in three volumes shows in part the transfers and coinages since 1860. These new modern terms inserted by the alert Japanese, though once despised by the Chinese, are now liberally appropriated by them, for use in the 20th century China of newspaper days and are gladly made use of also in textbooks and for both timely and abstruse publications. For this reason it is quite certain that, for a long time to come, in Chinese Asia, the ideographic will hold its own

and triumph over phonetic speech or writing. About 1885 a strong movement was launched in Tokio to supplant the native script, by Romanization. The Romaji Kai, or Roman Letter Society, spent much toil, time and money in pushing the hoped-for reformation; but the writer of this sketch, at that time, told the chief promoter, then young, that he would count many gray hairs in his head before this desirable object was even measurably achieved. To-day, all idea of supplanting the Chinese characters is abandoned. While the colloquial is involved and prolix, the ideographic writing cannot be surpassed for terseness. As 85 per cent of our knowledge comes to us through the eye, one can see how, relatively, the Occidental is relatively handicapped and the Oriental is equipped. Even among us, the arbitrary signs, $ c. m., £ s. d. and the numerals 1 2 3, the mathematical and astronomical signs, etc.—a universal system—hold their own because of brevity, time-saving and easy apprehension. American scholars have borne an honorable part in creating an apparatus for the study and translation of Japanese. The pioneer labors of Van Reed, Liggins, Brown, Verbeck, Imbrie were followed by the grammar and dictionaries of James Curtis Hepburn, M.D., of whose lexicographical labors—the last edition of this great dictionary being in 1903—one Japanese said, "all others are but a second edition of Hepburn," while the complete version of the Bible into Japanese is acknowledged to be one of the most successful of modern achievements of this sort.

Consult Aston's Grammars of the 'Spoken Language' (1881); of the 'Written Language' (1904); Chamberlain, 'The Japanese Language' (1887); Satow and Masakata, 'English-Japanese Dictionary of the Spoken Language' (1879); Imbrie, 'English-Japanese Etymology' (1889); Prentys and Sasamoto, 'Japanese for Daily Use' (1905); Brinkley's 'Japanese-English Dictionary' (1896); Shimada, Y., 'English-Japanese Dictionary' (1897), and the valuable papers in the 'Transactions of the Asiatic Society of Japan' (1872, 1919).

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13. JAPANESE LITERATURE. General History.—Although the antiquity of Japanese civilization cannot be compared with that of China or Greece, it dates from a remote age. The history of Japanese literature extends over a period of 13 or 14 centuries, and it is therefore possible to give here only a brief account of its progress.

The 7th and 8th centuries A.D., which embrace the Nara period and some time preceding, may be called the Grecian age of Japan, for those who have studied the relics of sculpture, pictorial art, and the architecture of each period are impressed by the strong resemblance. In the sphere of letters, however, the remains are comparatively few. This can be explained as follows. Although Japanese civilization was of a high order in consequence of the influences of Chinese civilization and of Buddhism acting upon a nation eager for advancement, no vernacular letters had as yet been invented, and therefore books were written in Chinese or a very complicated method which made use of Chinese characters to represent the Japanese language. Hence the number of books written was comparatively small, and many of those which were written seem to have been altogether or partly lost. Of those still remaining we have the 'Kojiki' and 'Nihongi' in history and the 'Manyoshu' in poetry. We also have examples of the ancient Shinto prayers and some Hoodoki—a series of books written in each province by the imperial command describing the geography, history and traditions of the provinces. In the field of pure literature the 'Manyoshu' may be considered to be a national treasure, while both the 'Kojiki' and 'Nihongi' are most valuable histories of primitive Japan.

The 400 years beginning with the 9th century are generally called the Heian era, and in some respects this may be called the Roman period. It was during this age that Japanese civilization, benefiting by the influences of the Nara period, made signal progress in every direction especially in literature. The intellectual activity of the period may be said to have divided itself into two currents: one for the study of Chinese letters and the other for the growth of the native literature. But the study of Chinese literature became so prevalent that men ambitious to distinguish themselves devoted all their energy to it and the writing of Chinese essays and poems was common, especially among the court nobles. At the same time the progress made by the native literature was highly commendable. It is significant, however, that the study of the native literature was pursued chiefly by females, and most of the standard works were the production of women. Though there were no native letters during the Nara period, toward its close we have the Kana, or Japanese phonetic alphabet. But it was not until the Heian era that the system of letters was definitely settled, thus making it possible for the first time to write books by phonetically transcribing the native language. The books written according to the new system during these four centuries were numerous, and what may be called the Japanese classics were mostly the production of this period.

The literature of the period may be roughly divided into three classes. The first and most numerous are the books known as Monogatari; the second kind are the diaries, and the last, but not the least important, the miscellaneous works. Monogatari literally means a narrative, but some of this literature are pure works of fiction, and some, such as the Yeika Monogatari, are historical works, though written in a somewhat novel style. There are also several books which are called Monogatari, but more properly belong to the third class. Works of fiction occupy the greater part of the Monogatari class. Here again, many books written during this period have been lost altogether; some are remembered by name only and others remain in a mutilated and confused form. The principal of those still remaining is the 'Taketori Monogatari' (Bamboo Cutter)—a short novel, considered to be the most ancient of its kind. A divine maiden is the centre character of the narrative, which tells of many incidents of courtship by several admirers, ending in the

ascent of the maiden to heaven. Consult (Victor Dicken's English translation). Next comes 'Ise Monogatari.' Although this book is called Monogatari its style belongs more to the third kind — miscellaneous. Its chief interest lies in the poems it contains, and therefore it cannot have so much charm for foreigners as for Japanese. After these two works come the 'Yamato Monogatari,' 'Utsubo Monogatari,' 'Ochikubo Monogatari,' etc., containing such stories as of a Japanese student who, on his return from China, was shipwrecked and in the course of time reached Persia, where he learned the secret of flute playing from a divine personage, or as of a young lady who was badly treated by her stepmother. The stories are always concerned with love affairs. Of all the Monogatari, however, the most famous is the 'Genji.' This is a voluminous work written by Murasakishi kibu, a woman. It narrates stories of love affairs between a young prince, Hikaru Genji, and numerous ladies. From a moral point of view, there are several points which deserve criticism in this work. In fact, as far as its form is concerned, it has some resemblance to the 'Don Juan' of Byron. With regard to the phraseology, however, it has no such naked and disagreeable references as appear in Byron's work (consult the English translation by Viscount Suyematsu). Another work which is regarded as equally valuable with the 'Genji Monogatari' is the 'Makuranososhi' (Pillow Sketches). This is a book belonging to the third class and is written by Seishonagon, another lady writer. It is a collection of short sketches on various subjects, each showing the brilliancy of her pen. (For specimens of these sketches consult Aston's 'Japanese Literature.') Of later productions we may mention the 'Sagoromo Monogatari,' 'Hamamatsu Chiunagon' and 'Konjaku Monogatari.' One noteworthy feature is that Japanese works of fiction of this era far excelled in several respects those of China of the same epoch. Of the 'Nikki' (diary), may be mentioned besides the 'Nikki' written by the author of the 'Genji,' the 'Tosa Nikki' and 'Kagero Nikki,' which were written before the 'Genji,' and the 'Izumishikibu Nikki,' 'Sarashina Nikki,' etc.

For several hundred years following the 13th century literature in Japan showed a significant decline. This was due in the first place to the fact that the authority of the imperial court suffered a decline concurrent with the rise of militarism, accompanied periodically by civil wars. Intellectual studies were totally neglected among the common people and scholarship in a large measure became a monopoly of the monks. This decay, in the second place, is attributable to the fact that the pure native literature which flourished in the Heian era disappeared, and a new style of writing arose,—a mixture of the Chinese character and the Kana. While resulting in no improvement in the system of writing this produced much confusion, and the mode of writing was thrown back almost to its condition in the Nara era. But the number of literary works produced during this period was not small, and they may be said to possess a significant peculiarity of their own. Enlightenment during the Heian period was confined chiefly to the nobles in the capital (Kioto), but unfortunately it became debased into mere empty luxury, resulting in the corruption and effeminacy of manners and customs. As a result, the literature of the period lacked vigor and force. The chief endeavor of writers was for refinement and grace. They became weak and diffuse. Moreover, the writers of the period were mostly women, and even men generally imitated the female style. Since the 13th century, however, the chief literary productions, as the result of the prevalence of the military spirit, dealt with war-like themes, though they were mostly written by priests, and were commonly known as 'Gunkimono' (War Narratives). They were written somewhat in the style of romance, and, therefore, from a strictly historical point of view, may be open to criticism; but nevertheless they form interesting reading. Of such books we may cite the 'Hogen Monogatari,' 'Heike Monogatari' and 'Genpei Seisuiki.' Such were the general conditions from the 13th century to the middle of the 14th, which embrace the Kamakura and Hojo periods, and in fact the same conditions continued down to the end of the 15th century, namely, the Ashikaga era. The famous 'Taiheiki' was an early production of this age. Mention should also be made of the 'Jingo Shotoki,' which was a historical work of a serious nature, with critical observations, a rare production in Oriental history. Another well-known book is the 'Tsuredzuregusa,' which was written in pure Japanese style after the one which appeared during the Heian period, being a collection of short sketches in much the same style as the 'Makuranososhi' (Pillow Sketches). (For specimens consult Aston's Japanese Literature). In conciseness and pointedness of expression it excels the standard works of the latter period and is classed among Japanese classics. The 'Hojoki' is also of similar nature.

The period which can be compared with that in modern Europe dates from the beginning of the Tokugawa era down to our own day, namely, the last three centuries. For nearly 300 years, i.e., since the establishment of the Tokugawa Shogunate in the beginning of the 17th century, Japan enjoyed practically continuous peace, the country during this time being almost entirely secluded from the outside world. In this period intellectual study made great strides under the encouragement and patronage of the Shogunate itself and the feudal lords. Owing to the rapid growth of the new cities of Yedo (Tokio) and Osaka, the centre of literary activity, hitherto concentrated in Kioto alone, was now divided between Yedo in the east and Osaka and Kioto in the west. This literary activity was divided into three great phases: first, the revival of Chinese study; second, research into Japanese classics; and, third, activity in the production of all descriptions of fiction and dramatic pieces. As for the revival of the study of Chinese, it not only surpassed that of the Nara and Heian eras, but in the subjects of philosophy, history, Chinese poems and essays, the work was even an object of admiration of the Chinese themselves. The study of Japanese classics resulted in a better knowledge of the ancient books of the Nara and Heian eras, as well as in a clearer conception of the Shinto doctrines. In the sphere of pure literature, however, the revival failed to regain the standard represented by the 'Manyoshu' of the Nara era and other classical works produced in the Heian era. Thus we

can see that the revival of both the Chinese study and the research into classical works, although both greatly helped the advancement of general culture, were unable to produce any brilliant native literature, owing to the fact that the first was altogether foreign to the native tongue and the second mainly limited to research into the works of antiquity. It is in the third phase — the growth of fiction and drama — that we must seek the real merit of the native literature. In scholastic attainments, the writers belonging to this class were not equal to those belonging to the other classes, but their imaginative power and adaptability far excelled the others. While the full scope and variety of the literary productions of the period cannot be given here, it can be said that these works of fiction may be roughly divided into three classes, namely, heroic stories, such as those of Bakin; love stories, such as those of Tamenaga; and the humorous miscellaneous works of such writers as Ikku.

Since the introduction of modern European civilization Japanese literature has shown new vigor, and books of all kinds have been written and published in such an innumerable number as is unparalleled in any past period. The great drawback of the modern system of writing is that it differs from the spoken language. Besides, the use of pure, phonetic letters, without mixing the Chinese characters, has long fallen into decay. Many a writer is now engaged in endeavoring to identify the written and spoken language and devising all sorts of forms of composition. In other words Japanese literature is still in a transitory stage, and therefore there are no standard works to show as specimens of the new literature It may, however, be said that many valuable works have already been written by representatives of the new generation, with great promise of further progress.

Japanese Poetry.

The oldest Japanese verses in existence are those contained in the 'Kojiki' (*vide* Chamberlain's translation) and the 'Nihongi.' This work was written in the beginning of the 8th century and contains the history of Japan from the so-called "God Period" nearly down to the time of writing. Therefore the dates of some of the verses therein contained are very remote, and it is almost impossible to fix the exact date. Since the 7th and 8th centuries the study of Chinese has become so common and prevalent that from those periods poems in Chinese have been composed by Japanese throughout all succeeding ages. Thus poetry has been of two altogether different kinds; namely, in Chinese and Japanese. The development of the Chinese poetry, too, has been so great as to be almost incomprehensible. To go into more details, at the end of the 8th century there was already a collection of Chinese poems entitled the 'Kaifuso.' During the Heian era the composition of Chinese poems became much more prevalent and collections which were then made were numerous. The writers were generally men, but women were not wanting. From the Kamakura era down to the Ashikaga era, Chinese poetry declined in the general decay of all literary pursuits but was not altogether lost. During the last three centuries, together with the general advancement of literary study, Chinese poetry has made such a striking development as to eclipse that of the Heian era. As, however, the Chinese school of poetry is after all foreign to our real purpose, we must dispense with a detailed account of it here.

The oldest Japanese verses next to those in the 'Kojiki' and 'Nihongi' are those of the 'Manyoshu.' The greater part of these belong to the Nara era, namely, the 8th century, and a portion belongs to the latter part of the 7th century. The most celebrated poet of the period was Hitomaru, who flourished toward the latter part of the 7th century, and the next in degree is Akahito. These two are considered by common consent as the greatest Japanese poets. Next to these we may mention the names of Okura, Yakamochi, and a woman, Odomo Iratsume. (For specimens consult translations by Chamberlain, Aston and Dickens). During the Heian era poetry flourished between the Chinese study on the one hand and the Japanese literary pursuits on the other. There are seven or eight collections of poems made to the order of the successive emperors, headed by the famous work 'Kokinshu,' besides many private collections. (For examples of some of those in the 'Kokinshu' consult the English translations above mentioned). Even after the Heian era the influence of the Japanese poems was still felt and collections by Imperial orders were made from time to time, the total number of such collections made by the Imperial order being altogether 21.

Among the most celebrated poets, men and women, of the Heian era, we may mention Narihira, Komachi (a woman), Sojo Henjo, Tsurayuki, Mitsune and Shunzei; and among those who flourished in the latter part of the period and the Kamakura era, namely, the latter half of the 12th century and the early part of the 13th century, the names of Teika, Karyu, Saigyo and Sanetomo (the third Shogun of Kamakura). From that time down to our own day poetical composition has been maintained unbroken, so that it is impossible to give minute description of it. But from the fact that the presentation of poems to the emperor and the holding of the so-called "poetry-meeting," forms one of the court ceremonies at New Year, it may be seen how deeply this poetic desire is connected with Japanese national life. When we look over the whole history of Japanese poetry, its golden age must be assigned to the Manyoshu period. This contains all sorts of poetic work, from those by the emperors down to those by the common people of remote regions, those by the court nobles naturally being the chief. All these seem to show how highly the poetic spirit developed among the Japanese people at large. Besides, the 'Manyoshu' contains the so-called "long" poems as well as "short," but since the Heian era "long" poems practically ceased to exist. Moreover, while the poetry of the Manyoshu age had force and energy, with concise and sharp expression, that of the Heian era developed on the side of gracefulness and elegance, losing the strong points of the Manyoshu poetry. Thus comparing both the strong and the weak features of the Heian era with those of the Manyoshu age, we can decidedly say that Japanese poetry already showed a marked decay, and this decay has continued through all ages down to our own time.

Beginning about 300 years ago, a new poetic style called the Haikai or Hokku was developed. This form of verse is even shorter than the "short" poems and has come to prevail side by side with the ordinary poetry. While this latter chiefly prevails among the higher classes of people the Haikai finds favor generally among the lower classes, and therefore is sometimes called the "people's literature." The Haikai possess peculiar merit and forms a distinct branch of Japanese literature. This style also has a remote origin but we must refrain at present from giving a more detailed account.

Following the Ashikaga era, that is, the 14th and 15th centuries, the so-called Renka ("joined poems") prevailed chiefly among the military class. How this style is composed is perhaps worth relating. Several persons form a party, when one composes the first short line of 17 syllables, the next the second line of 14 syllables, the third another of 17 syllables and the fourth 14 syllables, and so on. Hence the name of this peculiar class — perhaps a better term in English would be "coalition" poetry. Each line must be connected in meaning with the preceding one in such a manner that the connection should not appear to be direct. This explanation, perhaps, will be incomprehensible to those not versed in the subject, but it is the most important and interesting character of this poetry. The Haikai is derived from the Renka. In it the lines are composed in a similar manner and the act of so doing termed Tsukeai, that is, "joining together"; the result is known as Kasen. The most important line of the Kasen is the first (Tateku) and it forms a complete poem in itself. This first line, being the opening one of the whole series, is the Hokku, that is, the commencing verse. In common practice, however, as a rule the first line alone was only to be composed. Hence the Japanese poem in its shortest form became known as the Hokku. The best-known poet of this style is Basho, who flourished about 200 years ago. Prior to Basho, the Hokku had shown a comic tendency, but he changed it, and created the Shofutai, or legitimate style. He is probably the foremost among those who really inherited the spirit of the Manyoshu age and the Heian era.

As to the form of Japanese poetry, there is no rhyme nor strict metrical cadency. About the only element in which poetry differs from prose is that in the former five or seven syllables form one line — strictly speaking, a sentence, for it is not always written in the form of a separate line as in the Western poems. This peculiarity is entirely due to the nature of the language, for poetic euphony and sentiment can be acquired without the use of rhyme or metre. The common method of placing together these five or seven syllable lines is to place each alternatively commencing with a five-syllable line. But it is not necessarily a fixed method because some of the long poems commence with seven. In some cases, especially in popular songs, two or three lines of the same syllables are placed together. It differs according to the different periods and the nature of poems and there are lines which are either shorter than five syllables or longer than seven, intermingled with other lines for the sake of variety.

In Japanese composition even poems which are termed "long" are not so lengthy as many Western poems. The ordinary short poems consist of only 31 syllables, 5, 7, 5, 7 and 7, and the Hokku of only 17 syllables, 5, 7 and 5. "Japanese poetry is, in short, confined to lyrics, and what, for want of a better word, may be called epigrams." This is what Mr. Aston says of Japanese poetry and it is not very far from the fact. Under the circumstances, Japanese poetry when translated into another language will invariably fail to convey any poetical thought to the European mind in general. However, poetry of any tongue has its peculiar charming power to those who have grown up with the language — a power unknown to outsiders. This is most certainly the truth with regard to Japanese poetry. Let us give a few examples:

Tsuki ya aranu
Haru ya mukashi no
Haru naranu
Wagami hitotsu wa
Moto no mi nishite.

The plain literary translation of these lines would be:

Is there no moon?
Is the spring not the old spring?
My person alone remaining the original person?

This poem for Japanese possesses an indescribable charm,— food for sentiment and imagination. The meaning is that while the moon and spring are the same, I alone am not the same old person — told with a pathos which strongly appeals to the Japanese mind not only by its literary meaning, but also by the mode of expression. The piece is the most celebrated work of Narihira, the first writer of the Heian era. Again:

Furu ike ya
Kawazu tobikomu
Mizu no oto.

This is the best-known Hokku by Basho and is considered to be a masterly example of his so-called legitimate style of Hokku. Its literary translation cannot be other than as Mr. Aston has it:

An ancient pond!
With a sound from the water
Of the frog as it plunges in.

What can a foreigner make out of it? Yet it strongly appeals to the sentiment and imagination of the Japanese. It carries with it a philosophical idea which is comprehensible only to them. Another example:

Asagao ni
Tsurube torarete
Morai-mizu.

This poem is often quoted by many Western writers. Mr. Aston translates thus: "Having had my well-bucket taken away by the convolvuli,— giftwater!" What foreigner could find any poetical meaning in this without a lengthy explanation? Thus we can see that it is almost impossible to translate Japanese poems into any foreign language and convey their real sentiment and force of imagination.

Hitherto this short review has been chiefly confined to those poems which are chiefly designed for reading. There has, however, always been another kind, though less important in the strict literary sense, namely, verses used for singing or chanting. There are still extant

some scores of examples of this class of work from the Nara era and the early part of the Heian era. Since those early days, however, this form of poetry has undergone many changes and grown into many varieties. Generally speaking, these productions are much longer than the ordinary poems. Even the 'Yokyoku' and 'Joruri' are nothing more than a modified form of poetry, but these are dramatic pieces in a sense and we must defer our discussion on this class to the section of the drama.

The Drama.

Theatrical performances in Japan began to assume their present style about 300 years ago. But the origin of the drama is very remote. In the Nara era there were the so-called Kagura and Saibara — dances accompanied by singing and music performed chiefly in Shinto shrines. The difference between the two is slight, the Saibara having a more humorous tendency. Next arose the so-called Sarugaku and Dengaku, much in the same manner as the Kagura and Saibara. The difference between these two is also slight, with the exception that the Sarugaku is derived more from old dances, while the Dengaku has its origin in the pastime of the peasants. Many of the poems used in these various performances still remain. In the Kamakura era the Heike Monogatari, which was written in a high poetic style, was adapted for chanting in accompaniment of the Biwa, a string instrument. In the same era the Dengaku, probably influenced by the singing of the Heike Monogatari, underwent some alterations, and historical narratives having been introduced into the play, it began to assume the style of theatrical performances. This change was quickly followed by the Sarugaku. Hence arose the No of Dengaku and the No of Sarugaku, the term No being taken to mean performance. The Dengaku, however, soon declined and the Sarugaku alone made continuous progress. In the Ashikaga era, it became the chief source of pleasure for the upper classes, being patronized by the Shogun himself. Then arose a class of professional actors, and the gentry themselves began to learn to sing and even to play and had no compunction in doing so in the presence of their friends. While the acting is called No, the words, the written narratives which are to be sung, are called Yokyoku. In the time when the Sarugaku became popular to the disadvantage of the Dengaku, the term No came generally to mean the No of Sarugaku.

The so-called Yokyoku has much merit as literature. There are nearly 300 specimens of these Yokyoku and nearly all of them are the production of the Ashikaga era. They are not so long as those of the Greek or Roman comedies, but their construction has some similarity, for the words uttered by the actors are not limited to dialogues but contain descriptive parts as well. Thus when an actor representing a certain character appears on the stage, he generally announces who he is, why he has come there, where he is going to and such like. The method of playing has a certain similarity to the modern European opera, for the words uttered by the characters are sung and not spoken all through. The general features of the play show that these works were greatly influenced by Buddhism. This is due in the first place to the fact that the religion exercised much influence over the mind of the people at large, and in the second place to the fact that the playwrights were mostly priests. From the scholastic point of view, the sentences in these plays are not free from defects, but they are strong in the poetical element and some parts of these works cannot be too highly praised. The Yokyoku and No may be called the classical drama of Japan. They enjoy the favor of the upper classes even to this day in the same manner as the opera flourishes in Europe side by side with the ordinary theatre.

After the No there is another class of performance called Kyogen, or short comedies. In ancient times the Dengaku and Sarugaku contained much of the comical element, but during the Ashikaga era, when the Yokyoku and No reached the height of prosperity and was at the same time greatly influenced by Buddhism, they became transformed into tragedy, or at least became very serious in their nature. They lacked comic effects. The Kyogen arose to supply this want, and it became a general practice after a No performance for a Kyogen to follow, for the sake of change. No and Kyogen actors played on the same stage, but as a profession the Kyogen actors were and are considered to-day to be inferior. In the Kyogen, unlike the No, the words are spoken, though pronounced and uttered in the style of the Ashikaga era. As the chief object of the Kyogen is comedy, they have little of the poetical element. But as comedy they are excellent. The Yokyoku and Kyogen plays have always been printed, so that they may be read by the people who are not professional or amateur actors. There was still another kind of dance, or rather play, called the Kowaka, which prevailed side by side with the No. In this the words (text) were called Mainohon, many of which still remain. The Mainohon, like the Yokyoku, exercised much influence on the development of the theatre of later days, but these texts are very similar to those of the Yokyoku, and therefore we may spare any detailed account of them here.

The modern theatrical performance originated toward the end of the Ashikaga era, and soon acquired the name of Kabuki. Since then the name Kabuki has come to signify theatrical performance acted by human actors in contrast to the Avatsuri Shibai, that is, the marionette theatre. The Kabuki is said to have originated in the dancing and singing performed among other shows on a rude stage at the river side of Shijo in Kioto by a woman named Kuni, a native of Izumo. Into this singing and dancing, ideas of older performances, namely, the No or Kyogen, were introduced, and before long they assumed the style of the modern stage performance. On account of the origin of the Kabuki, the social position of this class has always been held in very low esteem, by no means comparable with that of the No actors. Kabuki actors have been generally known by the name of Kawaramono (Riverside people), but contrary to the No, which has made no change or improvement since the Ashikaga era, the Kabuki has undergone many changes and improvements from time to time until it has attained its present prosperity.

As to the Kabuki performances, in the early

stage of development women were the chief actors, resulting in the term Onna Kabuki. But boys were also employed and a little later on, even grown-up men. A peculiarity in those days was that women played male characters and men the female. Women Kabuki became extremely popular. Many stages, rude as they were, were established everywhere, but the acting produced much evil effect on the morals of the people and it was finally forbidden by law. Next flourished for a time the so-called Wakashu (boy) Kabuki. This again produced social evil and was forbidden by law. Thenceforth the performers were mainly grown-up men, as we see them on the modern stage, who acted the female characters. As time went on, however, women performers came into existence again, but they formed companies of their own sex only, and the male characters were played among themselves. The number of actresses is now very small comparatively.

In the early days of the Kabuki, the performances were short and simple, plays consisting of several acts having come into existence only by gradual development.

In the beginning there were no professional playwrights. Plays were chiefly written by actors or some one who took an interest in the matter, and further, plays were even devised by the actors impromptu and not written at all. Later on the stage began to have professional playwrights attached to each theatre. Unlike the drama in Europe, these plays were never printed for public circulation, but used only for acting at the time, and were often written more to suit the performers than for literary excellence. And again when an old play was acted it was often subjected to alteration for similar purposes; in other words, the dramatic personæ are often reduced or added to to suit the number or ability of the actors. And therefore the texts of the Kabuki have not much literary merit. Though it may look somewhat strange, it is in the plays of the marionette theatres that we must seek the equivalent of the European drama. The marionette performance originated about the same time as the Kabuki. Previously, there had been a particular kind of chanted narrative, the Joruri, which name is said to have come into use in a long chanting song consisting of 12 sections, and telling of a love story between Yoshitsune and a maiden named Jorurihime. This was written by a lady and was entitled 'Jorurihime.' Subsequently many works of a similar nature were written and the introduction of the Samisen (a three-stringed musical instrument) gave much impulse to their development. To the chanting of these songs the marionette performances were added. Various styles of chanting were also gradually introduced. Toward the end of the 17th century there arose two great geniuses, Gidayu Takemoto and Monzaemon Chikamatsu. Takemoto had a great natural gift for chanting Joruri, and devised a new style of chanting which became known as Gidayu. Chikamatsu was a playwright of the Kabuki. He hit upon the idea of writing Joruri texts based on the principle of the Kabuki plays. Gidayu Takemoto chanted them to the acting of the marionettes, for which the new theatre known by the name of Takemotoza was established in Osaka. There were then skilful marionette players, and many mechanical improvements were added to the marionettes themselves. By the combined efforts of these two authors and these skilful players the marionettes soon acquired a very wide popularity. The success of this theatre was followed by the establishment of the Toyotakeza, and many writers of great ability, rivals and followers, appeared in succession, such as Kaion Ki, Izumo Takeda, Ippo Nishizawa and Sosuke Namiki. Chikamatsu himself wrote nearly 100 pieces, and his rivals and followers wrote a large number. It is almost a matter of wonder that so many writers of ability made their appearance one after another nearly at the same time. It is also a fact that nearly all the ablest writers were drawn to the side of the marionette theatre, leaving the Kabuki writers far in the background. This state of things now came to exercise great influence upon the Kabuki theatres, and perforce they soon began to adapt the marionette plays for their own stage. The text of the Gidayu is written in a manner somewhat similar to the ordinary works of fiction, containing much descriptive matter as well as dialogues. The point in which the Gidayu differs from the ordinary novels or romances lies in the fact that the general construction of the Gidayu is made to fit the stage and consequently a lengthy description or dialogue is avoided, the whole story being divided into a certain number of acts of nearly the same length. Besides, as the whole is to be chanted, the phrases are suitably written, for which purpose certain metrical devices are applied. These plays are divided into two great classes; one, Jidaimono (historical) and the other, Sewamono (social). The chanting of the Gidayu text is also widely practised independently of marionette performances and is very popular among the people at large. From this fact these texts are printed and widely circulated. Their great popularity encouraged writers to exert their utmost ability. Scrupulous attention was paid to minor things. At the marionette performance the chanters sit in one corner of the stage while the marionettes are worked by the players in harmony with the chanting.

Like the ordinary plays, action and dialogue in the Gidayu exaggerate, being too direct and strong. We must, however, make allowance for this from the very nature of the play, because the marionettes are mere puppets and the realistic effect on the stage must come from the chanting. If action and dialogue were as common as those of the ordinary actors they would be insufficient to produce the desired effect on the spectators. For specimens of the Gidayu text we may refer to the English translation of the Chushingura ("Magazine of Loyal Retainers") and the Asagao-Nikki ("Morning Glory Diary"), both by Victor Dickens. We may also take notice of one other thing. In these plays the proverbial saying encouraging what is good and chastising what is bad is always aimed at, and they are not so full of love stories as Western plays. In them mere representation of realism is not the main object. The best plays were written in the 18th century during the Tokugawa era.

Although in all fields of literature much progress has been made since the Restoration of the Imperial authority 40 years ago, the

production during this time of the Gidayu may be said to be almost *nil*. On the other hand several Kabuki plays were written by eminent scholars and some of them are of much value, as for example the Kasuganotsubone, written by Mr. G. Fukuchi. Generally speaking, however, playwriting is still in a transitory stage and it cannot be said as yet to have made a brilliant addition to Japanese literature.

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14. HISTORY OF JAPANESE FINE ART. In giving an outline of the history of Japanese fine art it is to be noted first that there are two factors: one which has proceeded from the character and ability of the nation, and the other from the influence of foreign civilization. These two factors, harmoniously blended, have resulted in the distinguishing traits of Japanese art, and brought forth its peculiar charm, so that its characteristics can never be fully comprehended unless we keep these in mind.

The occurrences which took place before the Yamato race, the ancestors of the present Japanese, settled on this island in the Far East are concealed in obscurity, although according to the descriptions given in the record there is no question that a certain stage of civilization had already been reached at the beginning of the foundation of the country. Seen from the material point of view, the Japanese ancestors had emerged from trogrodyte habit and dwelt in thatched houses; for dress they wore trousers and hat or crown; used strung jewels for ornament; and farming and sericulture were their occupation. They knew the art of making pottery and manufactured earthenwares, such as vases, shallow dishes, etc. Metallurgy was also known, for they made spears or halberts, swords, bells, mirrors, etc. From the spiritual point of view, they were early characterized by profound reverence for the deity, and the custom of regarding their ancestors with veneration prevailed among them. We learn that they expressed their passion in poetic compositions, and enjoyed dancing and singing accompanied with music. These and various other traditions help us to form an idea of the character and manners of the early Japanese. They respected superiors and elders, being united in clans and families; and if order among themselves was rigorously maintained, there was a beautiful custom of gentle manner. Although they were distinguished by martial spirit, yet they were compassionate and never indulged in savage cruelties; cleanliness was universal; unreasonable obstinacy was looked upon with aversion, and they were frank and sincere. From their lively nature they took pleasure in singing and dancing. Although no particular dexterity in art was to be seen, we have sufficient evidence to show that there already appeared the bud of art. Such was the state of the primitive Japanese tribes. And when we examine the power which contributed to the development of their character and habit, we find that the most potent influence was that of the physical features of the country.

The island of Japan lies in the Pacific Ocean on the east of the Asiatic continent, and extending from north to south it includes many degrees of latitude. As one extremity touches the frigid zone and the other the torrid zone, the natural scenery continuously undergoes kaleidoscopic changes in the four seasons, hence there is no monotony of surroundings. In addition to this, the cold and the warm ocean current rapidly flows around, and the trade and the seasonal winds blow over the land, thus regulating its climate or causing it to change. Above all, the two mountain systems of China and Karafuto (Saghalien) and their branches penetrating the length of the island, and their lofty ridges, covered with thick forest, are everywhere seen piled one upon another. The air, full of moisture that comes from the ocean, strikes these walls and turns to cloud, mist, rain or snow, thus constantly playing wonderful tricks of transforming nature, and the more "lends enchantment to the view" of mountains and waters. There is a lavish variety of fauna and flora. Fine trees and rare grasses, some with lovely flowers and leaves, others producing delicious fruits and berries; birds and insects singing and chirping and displaying beautiful plumes — these entrance men's hearts and enrich their imagination. That the Japanese race, being environed with such splendid natural views and influenced by them, and storing up the poetic as well as the artistic thought, should have produced many celebrated masterpieces of art is to be expected as a matter of course. Yet the land is bounded within narrow limits, with no huge mountains, no gigantic streams, no extensive plains and marshes; the climate is not extremely intense; no animals of monstrous forms with peculiarly deep hues or with ferocious and horrible natures are met with; and no plants and flowers of deep color or pungent smell are found; so that the influence which they exercise upon the inhabitants is not very sharp and acute in its character. As a consequence Japanese art is destitute of that profound and imposing trait which defies man's calculation, but consists in pieces of fine plans executed with dexterity and tinged with grace and refinement. Moreover, the mild temperature, and the fertile soil that yields abundant products, have given the people means for easy subsistence without a violent struggle for life,— thus causing them to acquire a calm and gentle nature.

Besides, the country being isolated from the Asiatic mainland by sea, the nation has been free from foreign aggression and from the evil influences of the continent. Down to the last days of Tokugawa Shogunate she had little external trouble apart from the wars with Korea and the invasion she suffered from the Mongols. Even on these occasions victory always lay on her side, and consequently the people have been preserved from prejudice and exclusivism — faults so apt to be found in nations that have frequently experienced hard treatment from victorious invaders. The Japanese have ever shown hospitality to foreigners

and have assimilated and profited by foreign civilizations. Nor have the numerous civil wars left the people destitute of feeling or given them a cruel character. The land standing, so to speak, on a group of volcanoes, terrible devastations have often afflicted the nation; yet it has not impaired their optimistic disposition, fostered by the rich bounties of Nature. They even take delight in viewing the strange and majestic forms of the volcanic rocks and use them as materials of poetry and painting.

In short, such noble traits as piety, benevolence, alertness, cheerfulness, artistic inclination, simplicity, purity, bravery, sobriety and straightforwardness, may be found in abundance among this nation. Moreover, they are wonderfully clever in the use of their fingers, shown in a variety of artistic employments. They are not a people of profound speculation, but are highly gifted with intuitive insight and assimilative and ameliorative capacities. These national characteristics are manifest through the entire history of Japanese art and constitute its main features.

As has been stated, the Japanese love sobriety and simplicity and are by nature disinclined to ostentation. Hence their productions are marked by grace as well as skill. We can readily see that the young shoots of Japanese art sprang up in the earliest period of their national existence, though owing to the want of necessary encouragement their growth was not rapid.

The oldest forms of artistic design seem to have been ornaments used in decorating dress, weapons, tombs, coffins and articles employed in religious ceremonies. This may be proved by various archæological relics, discovered in many districts. They have, however, little artistic merit, and are only valuable as throwing some light upon ancient art — for showing us specimens of original and purely Japanese art.

From the very outset of authentic history the Japanese commenced intercourse with the Koreans, and the latter's civilization, primitive as it was, at once began to influence the former, but not so much as to accelerate the development of their art. The subjugation of Korea by the heroic Empress Jingo (201 A.D.) bound Korea to send annual tributes to Japan, and through this channel the art and industry of the continent flowed into the island empire. Later, in the reign of Ojin, Pep-che (Kudara), one of the three Korean states, introduced to Japan the literature of China. This event marks a great epoch in the history of Japanese civilization; after that every institution was copied from China, artisans were invited, and during the reign of Yuryaku, In-sa-ra-a (Inshiraga), a painter of Pep-che, was employed. In the 13th year of the Emperor Kimmei (A.D. 552) the king of Pep-che presented a statue of Buddha, a copy of the sacred canon and several articles of ornament, such as banners and canopies. The statue had been made in China after the "Six Dynasties' style," and it was the first Buddhist image to come to Japan. With these presents Buddhism found its way into the empire and became an important factor in the progress of Japanese art.

The civilization of the Asiatic continent has so strongly influenced Japanese art that, since its first introduction, its every wave and billow have left some trace on the art of Japan. Thus the ancient art of China and Korea opened the way for the artistic progress of Suiko's reign, and the flowery times of the T'ang dynasty had their counterparts in the age of the Emperors Tenchi, Shomu and Kwammu. And if we take into consideration the fact that during the "Six Dynasties," and the dynasties of Sui and T'ang, China already had close intercourse with India, which, in its turn, was in contact with Greece and Rome, we may justly say that the early civilization of Japan was indirectly connected with those of Europe and India. During the age of the Fujiwara's regency Japanese art began to assume a definite form and even developed certain distinct features, but subsequently in the age of the Kamakura and Ashikaga Shoguns, Chinese influence (Sung and Yuan dynasties) became once more remarkable. However, it was not of long duration; for in the Toyotomi and Tokugawa régimes national art again took its own course, though we must not neglect the fresh effect produced on it by the new civilization of Ming and Ching dynasties.

Thus we see the great and constant influence of foreign civilizations on the artistic history of Japan, yet it would be a gross error to regard Japanese art as nothing but an imitation of the arts of India, China and Korea, and that without these prototypes Japanese art would never have existed or would never have emerged from its prehistoric stage. There would be nothing wrong in calling Japanese art a branch of Oriental art, but it has a nobler mission than being a mere branch — it aims at extracting the essence of Oriental art and constructing it on a purified and ennobled basis. Though it has been guided and encouraged by exotic arts, it has never been a blind follower: it has digested them and, at the same time, has well preserved its own individuality.

India, China and Korea have all failed to stem the tides of foreign aggression, their national existence has been destroyed or threatened, and their old civilizations have been wiped out. The result is that it is impossible to admire their ancient glory or to recover their old treasures among the crumbling ruins. Japan, on the contrary, having remained immune from any of these disasters, her oldest productions are still extant, and even foreign objects of artistic and historic interest may be found within her boundaries. And since every step of the development of her art may be distinctly traced, its study will afford an insight into the artistic history of the foreign nations with whom she has been in contact. Indeed it is no exaggeration to say that the cream and essence of Oriental art has been preserved nowhere but in Japan, and by its people it will be worked to perfection.

Would it be possible to name the characteristics of Japanese art — the features underlying all its branches: painting, sculpture, architecture, industry, etc.? We may mention the following three. The first is mildness and pure simplicity. Coloring is for the most part sober and plain, and very seldom gorgeous. Japanese art prefers moderation and genial ease to excessive grandeur; sobriety and chastity to profundity, intensity and vulgarity. Even such horror-inspiring subjects as the pictures of hell are not thrilling in effect. The statue of Buddha at Nara is grand, but it is only the

high-water mark of continental influence and does not represent the pure Japanese disposition.

The second characteristic of Japanese art is its exquisite lightness or delicacy. This is due to the joyful frame of the people's mind and to the wonderful dexterity of their hands. There is no artistic product but is marked by charming workmanship.

The third feature is its idealism in representation. Japanese art is not realistic, it does not aim at photographic accuracy, but by the free and bold exercise of imagination it tries to abstract the essential aspect of objects and to give expression to the artist's sentiments by its portrayal. It is for this reason that form is comparatively little regarded, while idea is considered all important; that it is weak in realistic delineation and strong in decorative design. These three points underlie all Japanese art and distinguish it from the art of other Oriental nations.

With regard to the division of the history of Japanese art the opinions of scholars vary a great deal, so much so that it is an utter impossibility to settle the question definitely once for all, marking the beginning and the end of each period with absolute certainty and precision. Yet, in following out its development, it will be both convenient, and in some measure be justifiable, to divide the whole period into 12 portions, characterized by special features. It is to be remembered, however, that the treatment of the subject is necessarily short and summary owing to the limitations of space. And again, the title of each epoch is given for practical convenience and is not always identical with its namesake in the classification of political history.

(1) The Age of the Empress Suiko (540–644 A.D.). (2) The Age of the Emperor Tenchi (645–723 A.D.). (3) The Age of the Emperor Shomu (724–81 A.D.). (4) The Age of the Emperor Kwammu (782–888 A.D.). (5) The Age of the Fujiwara's regency (889–1086 A.D.). (6) The Age of the Ex-Emperors' regency (1087–1183 A.D.). (7) The Age of the Kamakura Shogunate (1186–1392 A.D.). (8) The Age of the Ashikaga Shogunate (1393–1573 A.D.). (9) The Age of the Toyotomi's Supremacy (1574–1614 A.D.). (10) The First Age of the Tokugawa Shogunate (1615–1744 A.D.). (11) The Second Age of the Tokugawa Shogunate (1745–1867 A.D.). (12) The Age of the Grand National Metamorphosis (1868– A.D.).

First Period.

The Era of the Empress Suiko (540–644 A.D.).—The æsthetic sense inherent in the Japanese race long remained latent and undeveloped. Not until the middle of the 6th century did the artistic endowment, or rather art-loving potentialities, of the people begin to reveal themselves in the land of the Rising Sun. The beginnings of the study of pictorial and glyptic art — the first page, as it were, of the history of Japanese art, must be dated from the time of the Emperor Kimmei when the civilization of the "Six Dynasties" of China (265 to 617 A.D.) was introduced through Korea and with it Buddhist images and sacred books were brought over to the country. Later, in the reign of the Empress Suiko, the empress herself became a devout believer in Buddhism, Prince Shotoku being no less enthusiastic a votary. With the object of propagating the religion through the land they invited famous priests and Buddhist sculptors from Korea, and by their order many images were made and temples and pagodas built in large numbers. Thus, under the Imperial patronage Buddhist art made rapid and signal progress.

In architecture the first work that calls for special notice was the construction of a monastery consisting of seven buildings (Shichidogaran), part of which grand work is still to be seen in the Kondo (Golden Hall) of the Monastery of Horyuji, Nara.

The native artist who crowned the first great progress of Japanese sculpture was Kuratsukuri-no Tori. One of his greatest works, the bronze statues of Sakyamuni and two attendant disciples (Shaka-Sanzon; 'Shimbi Tailkwan,' Vol. I; 'Kokkwa,' Vol. CLXIX) are still preserved in the Kondo of the Horyuji. The wooden image representing a goddess of mercy (Kwannon, i.e., Avalokites'vara; consult 'Shimbi Taikwan,' Vol. X; 'Kokkwa,' Vol. CLXXIV; 'Shobi Siryo,' Vol. IV, 4) in the Yumedono ("Dream hall") of the same monastery, attributed to the chisel of Prince Shotoku, is of the same style of homeliness and simplicity. Pictorial art had not yet been fully developed. Many families of painters had sprung up, however, and were engaged in the work of decorating Buddhist images and shrines. The so-called "mitsuda" picture (a picture painted with several pigments mixed with the juice of a plant called "mitsuda," which grows in India and other tropical countries) of the Tamamushi shrine in the Horyuji (consult 'Shimbi Taikwan,' Vol. II; 'Kokkwa,' Vol. CLXXXII) and reputed to be the oldest surviving specimen of the kind in the East, is fantastical in design, being a sort of pattern, and is, besides, plain in delineation and simple in coloring.

Of applied art the most advanced were bronze casting, sculpture on metal and metal tempering; while textile fabric and embroidery had not attained a high degree of excellence; decorative arts, on the other hand, achieved a great development. In fine, the art of this period is traceable to the Buddhist art of India introduced through China and Korea; and there is evidence that not a few of the works belonging to this era were produced by Chinese and Korean immigrants.

Second Period.

The Era of the Emperor Tenchi (645–723 A.D.).— During this period, busy intercourse having been established between Japan and China, the latter's civilization found its way direct into the former without passing through Korea as had hitherto been the case; most of Japan's institutions, laws, literature and religion were accordingly remodeled on those of China; and this, in no small degree, helped the development of various branches of art. Besides, as native artists had in the course of time acquired great dexterity in their workmanship the works produced during this period are characterized by grandeur and magnificence, and are deeply instinct with a serene and noble spirit. The famous sculptors, Yamakuchi-no-atai Oguchi and Yakushi Tokuho, flourished in the reign of the Emperor Kotoku. One of his greatest works, the images of the Shitenno

(the guardian gods of the four regions; consult 'Shimbi Taikwan,' Vol. IV; 'Kokkwa,' Vol. CLXV), is now in the Kondo of the Horyuji, and though the work does not emerge from the stage of plainness and simplicity, yet the features are mild and graceful. The images of Amitabha and two dependent Bodhisattvas (Amida-sanzon; consult 'Shimbi Taikwan,' Vol. III; 'Kokkwa,' Vol. CX; 'Shobi Siryo,' Vol. II, 6), a relic of the era of the Emperor Tenchi, and said to have been worshiped by Lady Tachibana, are distinguished by the fine workmanship of their halo and backscreen as well as by the gracefulness of their form and features, bearing testimony to the refinement and elaborateness attained by the fine arts of the epoch.

During this era the style of the T'ang dynasty rapidly gained ground, and influenced things in general, and art objects in particular, with the result that great works stamped with solemnity and elegance were produced, the images of Sho-kwannon (Arya Avalokites'vara; consult 'Shimbi Taikwan,' Vol. III; 'Kokkwa,' Vol. LV) in the "Toindo" (East Hall) of the Yakushiji, and the "Yakushi-sanzon" (Bheshajyagurú and two dependents; consult 'Shimbi Taikwan,' Vol. V; 'Kokkwa,' Vols. XV and CLXXXIII) in the "Kondo" of the same temple being among the best.

Toward the end of this period the art of modeling in clay increased with rapid strides, having produced Keimonye and Keishukun, famous sculptors in this period. Among the specimens of pictorial art is the mural picture in the Kondo of the Horyuji, representing the "Shibutsu-jodo" (the Paradises of Four Buddhas; consult 'Shimbi Taikwan,' Vols. II and XV; 'Kokkwa,' Vols. XXIV and CXCII; 'Shobi Siryo,' Vols. I and II) and famous for bearing resemblance to the old picture found in the temple of Ajanta Cave, in India. In its pattern is visible, in no small degree, a mixture of the Indian and the Greek style. Showing, as it does, traces of great power of line, color and composition, the picture is, indeed, a rare treasure of Oriental art.

Moreover, as the demand of the Imperial Court for furniture, ornamental dresses and decorative pictures increased, departments relating to various branches of art were instituted with the object of encouraging the people to cultivate the fine as well as the useful arts.

Architecture made a great development and attained a high degree of refinement. Unfortunately few, if any, examples of this art have been preserved, the east Pagoda of the Yakushiji, in fact, being the sole existing specimen of the work.

Third Period.

The Era of the Emperor Shomu (724–81 A.D.).— The civilization of the T'ang dynasty, introduced and copied in the preceding era, reached its highest point in this; the erection of Buddhist images and the construction of temples and pagodas were carried out extensively; and fine arts and various technical industries made noticeable progress, furniture, utensils and even playthings being made as showy and gorgeous as possible. The most celebrated monument representative of this glorious and flourishing epoch is the bronze representing Vairochana Buddha in the Todaiji. The statue is in a sitting posture and matchless for its colossal size, the height of the body being 53 feet 5 inches, the length of the face 15 feet, and all the other parts being proportionately gigantic. It is to be regretted, however, that having undergone several repairs in later ages, it has lost a great deal of its original form. The founder was Kuninaka-no-muraji Kimimaro.

The art of making clay and dry-lacquered images made striking progress during this period and attained a high degree of elaborateness and refinement. Among the specimens of the former are the images of "Shitenno" (Four guardian gods; consult 'Shimbi Taikwan,' Vol. I; 'Kokkwa,' Vols. XLII, CLXX and CLXXXIV; 'Shobi Siryo,' Vol. I, 4) in the Kaidan-in of the Todaiji, and the image of "Vajrapani" in Hokkedo of the same temple (consult 'Shimbi Taikwan,' Vol. VIII; 'Kokkwa,' Vol. XXVIII); while the "Bonten" (God Brahma; consult 'Shimbi Taikwan,' Vol. III; 'Kokkwa,' Vol. XXVI) and the "Taishakuten" (Indra; consult 'Shimbi Taikwan,' Vol. X; 'Kokkwa,' Vol. CCXXXI) in the Sangatsu-do of the Todaiji, and the "Kwannon" (Goddess of Mercy) in the Denbo-do belonging to the Horyuji (consult 'Shimbi Taikwan,' Vol. XV) are the most celebrated surviving examples of the dry-lacquered images.

The works of this period are signalized by a harmonious combination of reality and imagination and by the well-shaped forms of the bodies of the postures and of the foldings of the garments; while expression was by no means neglected.

Pictorial art also made a remarkable advancement in this era. The screen picture representing a beauty under a tree, in the possession of the Shoso-in of the Todaiji (consult 'Shimbi Taikwan,' Vol. XV; 'Kokkwa,' Vol. CCXXVI) and the Kichijotennyo (Goddess of Fortune, Sri) of the Yakushiji (consult 'Shimbi Taikwan,' Vol. II; 'Kokkwa,' Vol. LXXXV; 'Shobi Siryo,' Vol. I, 1) show that they were executed with a masterly caligraphic touch, both their faces and bodies being full of elegance and gracefulness, and especially the latter picture displays a gay and gorgeous coloring. The works of architecture were for the most part on a grand scale. The interior of the Hokkedo of the Todaiji, the Kondo of the Toshodaiji and the Shin-yakushiji all bear the marks indicative of the special features of this branch of art as prevalent in the period.

As for the progress of applied art it was simply wonderful. In this connection special mentions must be made of the treasure-house belonging to the Shoso-in of the Todaiji. There are kept in this store nearly 3,000 articles, all being specimens of fine and applied arts of this era; bronzes, textile fabrics, embroidery, sculptures, inlaid work of gold or silver, lacquer works, glass, enamel ware, mother-of-pearl lacquer works, gold-dust-sprinkled lacquer work, paintings of "mitsuda" (a kind of oil pigment) and Koketsu (a kind of dyeing) being well represented here. It will be seen that during this period many branches of applied art attained the highest degree of elegance and refinement, while their decorative patterns and figures were freely drawn from Chinese or Indian stories and events.

The gong called "Kwagenkei" with its

stand is to be counted among the masterpieces of this epoch by virtue both of its fine shape and its elegant casting. Consult 'Shimbi Taikwan,' Vol. V; 'Kokkwa,' Vol. XCVII.

FOURTH PERIOD.

The Era of the Emperor Kwammu (782–888 A.D.).— Soon after the accession of the Emperor Kwammu to the throne the capital was removed to Yamashiro (now Kioto); the Imperial palace built after the fashion of the T'ang dynasty; government was remodeled on Chinese plan, and various institutions reformed. Things took a new turn and the prosperity of the country greatly increased. What was more, this period produced such great priests as Saicho and Kukai. The former was the founder of the Tendai sect; the latter of the Shingon sect. They endeavored to spread the teachings of Buddha with great assiduity, enlightened the people and helped them into great activity. Such being the case, the fine arts of this period were signalized with a lofty and majestic idea. Kukai, or Kobo-daishi as he was called, was an accomplished priest of profound learning, and produced not a few excellent works of painting and sculpture. Among the specimens of his work is the image representing the deity Fudo (Achara) in the Toji, Kioto (consult 'Shimbi Taikwan,' Vol. I). The picture representing the priest Gonso, in the Fumonin, Koyasan (consult 'Shimbi Taikwan,' Vol. VI; 'Kokkwa,' Vol. CCXXIX), and the portraits of Nagarjuna and Nagabodhi in the Toji, attributed to him, are executed in noble and refined taste, and marked with elegance and grandeur (consult 'Shimbi Taikwan,' Vol. XII; 'Kokkwa,' Vol. CCXIV; 'Shobi Siryo,' Vol. I, 3). Saicho (Dengyo-daishi) was also a very learned and highly accomplished priest, credited with a great genius for painting and sculpture. The priest Enchin painted the Achara mostly; the Red Achara in the Myohoin, Koyasan, being his greatest work. (Consult 'Shimbi Taikwan,' Vol. VIII; 'Kokkwa,' Vol. CCXXXII). Beside Buddhistic paintings, artists of the time began to take up human figures, landscape, birds and flowers for subjects of pictures. Kudara Kawanari was a great master of painting of this kind.

Of the specimens of the sculpture of this epoch the image of the "Noyrin Kwannon" in the Kwansinji, Kawachi (consult 'Shobi Siryo,' Vol. II, 3), that of Achaon in the Tachibanadera, Yamato, that of Bodhisttoa Miroku in the Kwaizaudo, Todaji, and the statue of the priest Ryoben (consult 'Shimbi Taikwan,' Vol. VI; 'Kokkwa,' Vol. CLX; 'Shobi Siryo,' Vol. VIII, 1), are the finest relics we now have, being the most graceful and the least conventional, while delicately expressive and inspiring loftiness and grandeur. Besides these there are not a few masterpieces in this line.

Architecture made a great progress with the laying out of the new capital at Kioto, the Imperial palace and various offices built after the T'ang fashion being extremely fine and elegant. The construction of the Imperial palace was for the first time brought to perfection, and what was called the "Dai-dairi" (Court) style came into existence. The Tendai and the Shingon sects introduced a new feature into the construction of the temples, and the establishment of the incarnation theory ("Shin-butsu-dotai-setsu," i.e., theory that identifies Japanese gods with Buddhas) gave a certain Buddhist architectural style to the building of Shin-to shrines. The "Shimmei-tsukuri," i.e. the ancient style of shrine-building, gave place to the new ones, the "Kasuga-tsukuri" and the "Nagare-tsukuri." And, though the progress made by applied art during the period was not very conspicuous, the lacquer work industry attained a great development.

FIFTH PERIOD.

The Era of the Fujiwara Regency (889–1086 A.D.).— The epoch of the Fujiwara Regency was indeed a glorious period, stamped with great national development and prosperity: the nation at large flourished, and not a few customs and manners were formed and reached maturity. In the reign of the Emperor Uda the practice of dispatching envoys to China was discontinued, and in consequence the impetus from without ceased to come. The civilization which had found its way into Japan in the preceding age was fully assimilated in this, and Japan developed a new native style of her own. Moreover, the luxurious life led by the Fujiwara family and the great prevalence of Buddhism at that time conspired to help the advances of both fine and industrial arts, cultivating such special qualities as beauty, elegance, severity and refinement. In the early part of this period flourished Kose-no Kanaoka, the greatest pictorial artist the country had yet produced. He was famous for his pictures of Buddhist divinities, human figures, landscape, birds and flowers, all of which were said to be delicately fine and elaborate. Unfortunately, however, almost no specimens of his work have come down to the present age. But collating all the traditions circulating about him we gather that he was a great master of painting animal life, being true to nature; he seems to have struck a new style of his own, apart from those of the T'ang fashion. His descendants succeeded him and founded the Kose school, Kimmochi and Hirotaka being among the most celebrated members of the line. The picture representing the Prince Shotoku and his two attendants, in the collection of the late Viscount Saisho (consult 'Shimbi Taikwan,' Vol. XVII), attributed to Kanaoka, is an excellent specimen indicative of the characteristic gracefulness and elegance belonging to the early part of this period.

The priest Eri and Asukabe Tsunenori are believed to have been great masters of painting of this epoch. The priest Eshin, one of the promoters of the "Pure Land" doctrine,* mostly painted pictures of Amitabha Buddha, welcoming the devotees who come to his Paradise (Amida-raiko), his style being purely Japanese. The picture of Amitabha and the 25 Bodhisattvas, still preserved in Koyasan, is a great piece of work attributed to his brush. (Consult 'Shimbi Taikwan,' Vol. IV; 'Kokkwa,' Vols. LXXXII and CCXXXII). Takuma Tamenari is celebrated for his pictures on the walls and on the panels of the doors of the Howodo, Uji. (Consult 'Shimbi Taikwan,' Vol. IV; 'Kokkwa,' Vol. III; 'Shobi Siryo,' Vols. VII, 5, and III, 2). Takumino-kami Fujiwara Motomitsu, a great master of painting, is looked on as the founder of the Kasuga school. One

*"Pure Land." (Jodo) Sanskrit "Sukhavati." the Paradise of the worshippers of Amitabha.

of the greatest in the early part of this period is the painting of "Amida Sanzon Raigei," still in the Hokkaji, Yamato (consult 'Shimbi Taikwan,' Vol. VII; 'Kokkwa,' Vol. CLXVII; 'Shobi Siryo,' Vol. IV, 3) and the points of its nobleness and elegance are, indeed, the king of the religious painting in Japan. Sculpture came to develop a native style and greatly improved in due time, leaving at present the image of "Juichimen Kwannon" (Eleven Faces Goddess of Mercy) in the Hokkeji (consult 'Shimbi Taikwan,' Vol. II; 'Kokkwa,' Vols. CXXI and CLXXXIV; 'Shobi Siryo,' Vol. III, 5), and that of "Jizobosatsu" in the Shoreyin of the Horyuji, as the representatives in the early part of this period. This brand of art culminated in the work of the celebrated Jocho who introduced elegance, gracefulness and refinement in and improved the characteristic features of this period. The image of Amitabha in the Byodoin, Uji, Yamashiro (consult 'Kokkwa,' Vol. CLXXII; 'Shobi Siryo,' Vol. IV, 5) is believed to have been a production of the later part of his life. His son Kakujo and pupil Chosei succeeded him, each founding an atelier for religious sculpture.

Architecture also developed a new native style; temples were built in such a way as to present an elegant and graceful appearance on the outside, while the inside was superbly decorated with mother-of-pearl lacquer work and gold-lacquered work. Of the specimens of the architecture of this period the monastery Hosshoji constructed by the order of Fujiwara Michinaga is the most magnificent and the finest, built on a grand scale. Howodo in Uji and the Konjikido (Golden Hall), in the Chusonji, Hiraizumi, Rikuchu province, both of which are still preserved, though built on a very small scale, yet reflect something of the general style of architecture prevalent in this era. The mansions of noblemen were built after what was termed the "Shinden-tsukuri" (Sleeping-chamber-style), a grand and imposing style of architecture, and in the construction of the Imperial palace arose the "Satodairi" (Village-court), an informal and much simpler style than the "Dai-dairi" (Court). A native style began to stamp itself in dresses and furniture of all descriptions, affecting their shape and decoration not a little.

Lacquer works, textile fabrics and metal works abounded in elegance and tastefulness, and were free from conventionality, breathing loftiness; design became richer and more ingenious; workmanship and technique were carried to a high degree of elaboration and refinement; and not a few specimens of the work stamped with these noble qualities have come down to the present age.

Sixth Period.

The Era of the Regency of Ex-Emperors (1087–1183 A.D.).— The customs and manners which had been formed and had reached maturity in the preceding era attained a still greater development in this. Things were, on one hand, getting effeminate and conventional; while, on the other, reaction having already set in with the changes of the times, a lively and vigorous style began to assert itself. The power of the Fujiwara family had, indeed, been on the wane; but the Taira family, who had taken their place, having succeeded to their luxury and extravagance as well as to the political ascendancy, and having devoted their energies to the cultivation of belles-lettres, fine arts and technical industries did not show any sign of decline, and demand for arts-objects did not decrease in the least. In pictorial art Fujiwara Takayoshi originated a new style characterized by elegance and delicacy. The Genji-Monogatari-Emaki* is the existing specimen of his work. (Consult 'Shimbi Taikwan,' Vol. I; 'Kokkwa,' Vols. XVII, XVIII, CLXXX and CLXXXII). He was followed by his son Takachika, and it was in the time of Tosa-no Gonnokami Tsunetaka that the school bore the family name Tosa. Kakuyu or the "Bishop of Toba," as he was popularly called, had already started a new style, and painted a number of caricatures with a masterly caligraphic touch. His work Choju-giga-no maki (a collection of burlesque sketches of birds and beasts) is very well known. (Consult 'Shimbi Taikwan,' Vols. I–IV; 'Kokkwa,' Vol. CXXXIII). Mitsunaga is famous for his marvelously powerful brushwork, and has left us the Bandainagon-Emaki (a pictorial scroll representing the life of the courtier Ban). (Consult 'Shimbi Taikwan,' Vol. XIV; 'Kokkwa,' Vols. I, CLXXXII and CCV). Takanobu was a master of portrait painting. The foundation of the old Tosa school, representative of pure Japanese painting, is to be ascribed to these great artists.

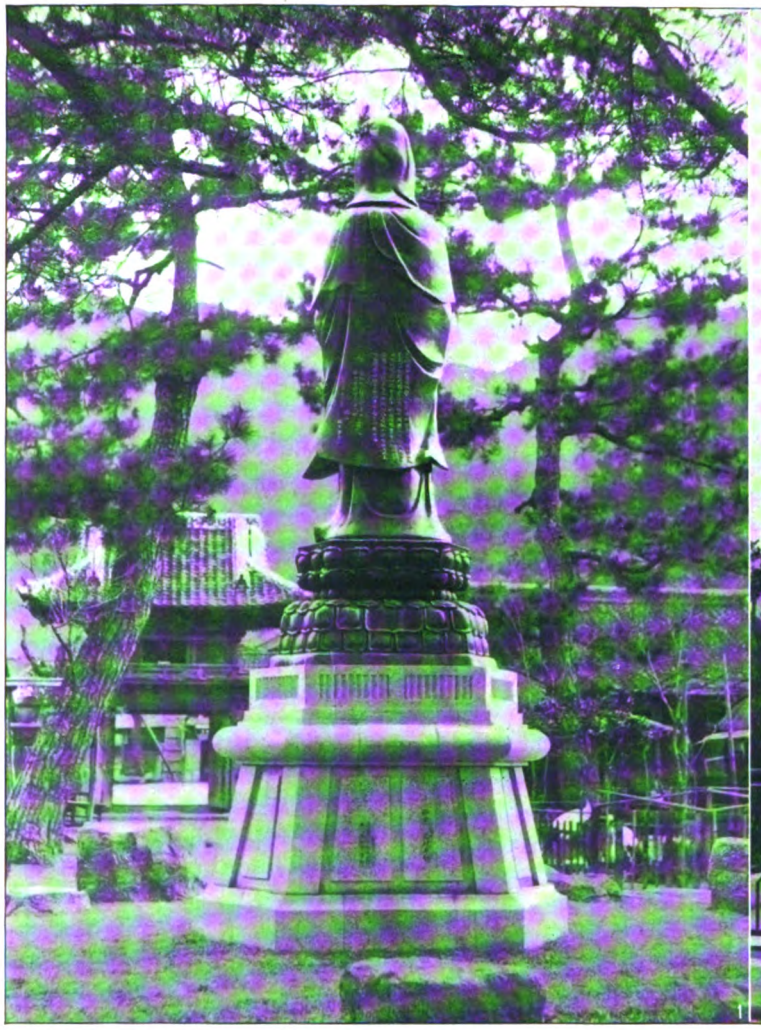
During this period the practice of loving pictures for their own sake obtained, and demand for beautiful pictures besides those painted for religious or decorative purposes grew larger and larger, pictorial scrolls were made much of. Taste for arts-objects was much cultivated among the upper classes, and there arose, in consequence, peculiar styles, such as the "Tsukuri-ye" ("making-up pictures") and the "Ashide-ye" (pictures painted with *Kana* characters), while the game called "Ye-awase" (picture-setting) was in great vogue.

The sacred book dedicated by the Taira family to the Itsukushima shrine bears witness to the artistic taste of those days, being ingenious in design and beautiful in decoration. (Consult 'Shimbi Taikwan,' Vol. VII; 'Kokkwa,' Vols. XV and CXIII). As for sculpture, though the descendants of Jocho kept up the traditional style of the family, yet it became more elaborate and showy, losing much of the loftiness and grandeur as shown in the works of previous ages. Architecture and other branches of applied art grew more and more delicate, and came to lack in strength and vigor.

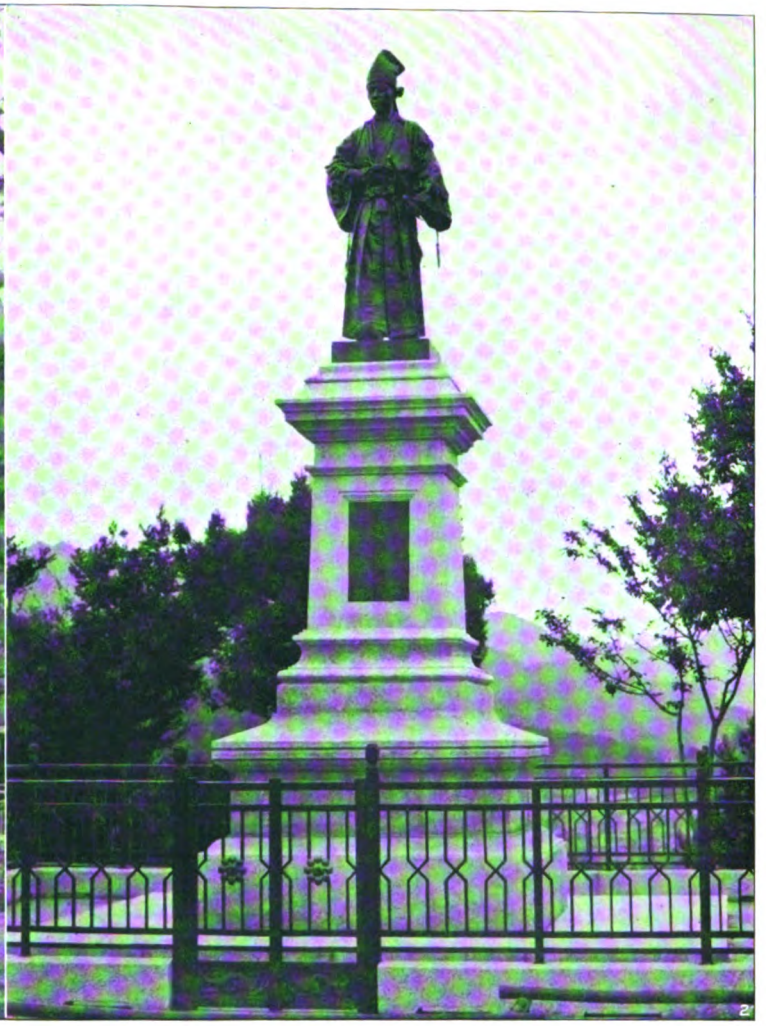
Seventh Period.

The Era of the Kamakura Shogunate (1186–1392 A.D.).— By the time Yoritomo originated the Shogunate at Kamakura, the spirit of simplicity and strength, characteristic of the military class of the time, naturally also found its vent in the works of art; their pervading features are force and manliness. The Zen (Dhyana), i.e., "meditation," sect of Buddhism which was introduced into Japan in this period, along with the then established Nichiren sect, with their astute doctrine, were not without their influences on the artistic productions of the age. The carved figure, so full of ro-

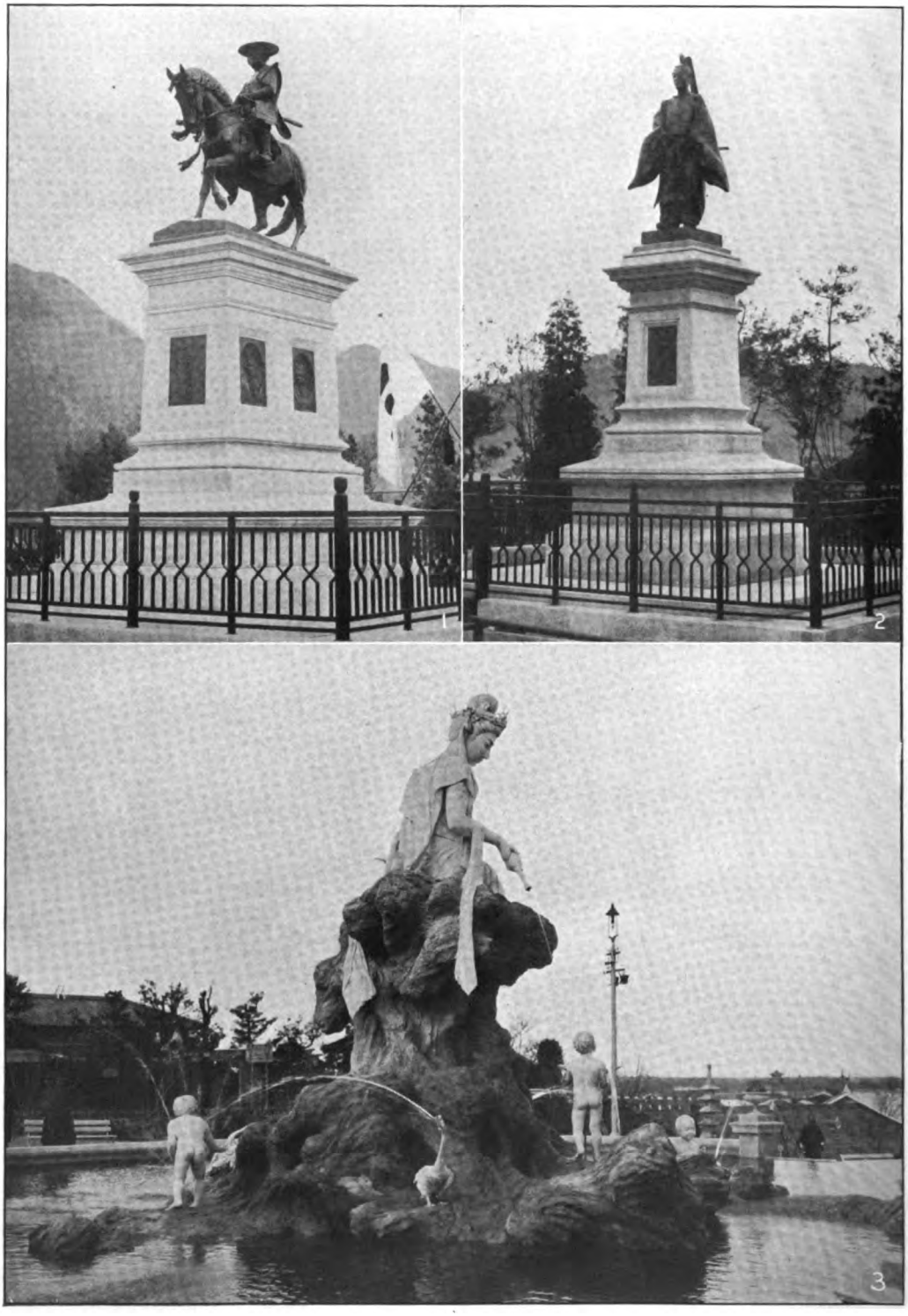
*The picture scroll representing the novel of Lady Mursaki Shikibu.



1 Bronze statue of Goddess of Mercy, recently erected by rich merchant of Osaka



2 One of the Daimios of Chosen in civil dress



1 and 2 Modern Japanese Sculpture in Choshi

3 The Kwannon Fountain, Birth of the River, Osaka

bustness, by the Buddhistic sculptor Unkei and his son Tankei, are most representative of its spirit. Even a great advance in faithfulness to nature and skill of expression is noticed in their works, among which the statues of the two guardian kings (Niwo) at the gate of the temple Todaiji, are looked upon as the now existent chef-d'œuvre. (Consult 'Shimbi Taikwan,' Vol. II; 'Kokkwa,' Vols. XI and XII).

Among the followers of the Unkei school of sculptors Jokei and Koben are to be mentioned. Kwaikei, also known as Annami, adhered to the older style of sculpture, and carved many statues of Amitabha.

As for the pictorial art, the characteristically Japanese modes of design and execution made a further development and manifested a great amount of activity. The Tosa school could boast of such great names as Sumiyoshi-Keion, the author of the 'Illustrated Scroll of the Heiji-Monogatari' (according to a certain tradition, this is attributed to Hamuro Tokinaga, but it is not credible; consult 'Shimbi Taikwan,' Vols. V and X; 'Kokkwa,' Vols. XVI, CXXXVI and CLXXXII); Nobuzané to whom the authorship of the illustrations in the 'Kitano-Engi' (consult 'Shimbi Taikwan,' Vol. IX; 'Kokkwa,' Vols. XXXVI and LXXXVI), and of the 'Illustrated Scroll of the Eigwa-Monogatari' is attributed (consult 'Shimbi Taikwan,' Vol. IV; 'Kokkwa,' Vols. XLIII and XLVII); Yoshimitsu, the author of the 'Illustrated Life of Honen-Shonin' (consult 'Shimbi Taikwan,' Vol. VIII; 'Kokkwa,' Vols. LVIII, CXLI, CLXXVII and CXCIV; 'Shobi Siryo,' Vol. II, 5); En-i, the author of the 'Illustrated Life of Ippen-Shonin' (consult 'Shimbi Taikwan,' Vols. II, XII; 'Kokkwa,' Vols. LXXIII, CXLVIII and CCVI); Nagataka, the author of the 'Sumiyoshi-monogatari' (consult 'Shimbi Taikwan,' Vol. VIII; 'Kokkwa,' Vols. LIII and CCXL), and the 'Illustrated Scroll of the Mongolian Invasion' (consult 'Kokkwa,' Vol. IX), and Takashina Takakané, the author of the 'Illustrated Scroll of Kasuga-Gongen-Kenki' (miracles of the deity of Kasuga: consult 'Shimbi Taikwan,' Vols. V and VIII; 'Kokkwa,' Vols. XXXI, CXL, CLXIV and CCXLI).

The Kose School continued to supply us chiefly pictures concerning Buddhism, Arihisa being the most famous of its supporters. Korehisa, although originally an artist belonging to this school, made a departure from it. The well-known 'Illustrated Scroll of the Later Three-Year-Campaign' is from his brush. Consult 'Kokkwa,' Vols. XII and CCII.

Shoga, a master belonging to the Takuma school, chiefly produced the Buddhistic pictures. Later on, Yeiga of the same school, made a study of the Chinese masters, such as Li Lung-Min of the Sung dynasty, and Wan-Hui of the Yuan dynasty. The picture of the Arahats (saints) was his favorite subject.

Near the close of the period now under consideration, a kind of ink-drawing introduced by the Zen (Dhyana) priests who had been to China under the Sung Sovereigns, came gradually to find in Kawo, Mokuan, Myotaku and others its able propagators.

From the architectural point of view, we must observe that side by side with a new style of building as shown in the Dhyana temples there arose in Kamakura a plain form of private dwelling, known as the "Buke-tsukuri" ("Military style").

The troubled state of the times necessitated the manufacture of warlike implements, and great progress is noticed in the making of armors and swords. Lacquer work also made a considerable advance. And it is during the Kamakura period that Kato Shirozaemon originated the Seto pottery on his return from China where he went to learn the ceramic art.

EIGHTH PERIOD.

The Era of the Ashikaga Shogunate (1393–1573 A.D.).— The period that followed the reunion of the Southern and the Northern branches of the Imperial line of descent was one of exorbitant luxury, in which the Shoguns of the Ashikaga family were sybarites enough to live. The astounding indulgence which marked out Yoshimitsu and Yoshimasa from among other extravagant Shoguns of the time did much to enhance the great developments both in arts and industry.

It is, however, not to be forgotten that the austere simplicity and directness of the Dhyana doctrine also fostered a taste for serene beauty among the people and that the tea ceremonial was very much in vogue as a form of its expression in the daily life. Hence the studied avoidance of wild luxuriance in the works of art of the period. The pictorial art of the Ashikaga period was totally under the influence of the Sung and Yuan masters. Priest Myn-Cho drew his Buddhas and Chinese sages, closely following the modes of delineating things as seen in the pictures of the Takuma school and those of the Sung and the Yuan dynasties. When the ink-drawing had begun to make its way among Japanese artists, among its votaries were Priest Josetsa and his disciple Shubun in the Oei period. These two gradually formed their own school by an eclectic of the Chinese masterpieces. Among their illustrious followers are Shinno, Jasoku, Sesshu, Sotan, Shingei, Shinso, Shokei and Masanobu.

Of all these well-known names that of Sesshu is most conspicuous, his works giving tests to his exquisite way of brushing as well as his fullness of manly strength. Indeed, he may be said to be the greatest artist Japan had yet produced, his works being marked by great sublimity. Masanobu is the originator of the Kano school. His son Motonobu made a deep investigation of the Sung and the Yuan masters, which he deepened by a study of the technics peculiar to the Tosa school. That is how he came to complete what his father had begun. Sesson was also one of the great artists in this period. The Tosa school had dwindled into common place during this period, and Mitsunobu was the only artist of the line who breathed a new life through his assimilation of the Sung mode of delineation. Sculpture showed a sign of decay in this period. No great names honored once so flourishing a branch of art. Nobleness of features which characterized the Buddhistic images was not to be seen in the new productions, whose very fineness of outward form only suggest effeminacy and formality. It is to be specially mentioned, however, that a new activity arose in the carving of the masks for the No-dancers—

a phenomenon that appeared as an outcome of the rise of the lyric drama.

In the field of architecture, the Dhyana style of Buddhistic edifices had reached its perfection, and the so-called "Shoin-dzukuri" ("Study-room-style") was called into existence. The manner of building the room where the tea ceremonial was to be exercised was something wholly unknown in the former periods and as a consequence greatly affected the style of gardening.

All forms of industry had made great progress through the increased demand and encouragement on the part of patrons. The making of armors and swords as well as the peaceful art of decoration was successfully carried on by their respective masters. Plain, gold or silver lacquering too came to be practised with wonderful skill and art. The great zeal with which the fashionable arts of the tea-drinking and the incense tournaments were pursued proved a most favorable stimulus for the production of the much-famed examples of the ceramic art. Many exquisite works of this period came from the furnace of Shozui, who visited China to learn how to make the céladon porcelain from the Ming artists.

NINTH PERIOD.

The Era of the Toyotomi (1574–1614 A.D.).— Toward the close of the Ashikaga period the empire was thrown into a state of utter confusion, but when Oda Nobunaga gained the controlling power over Japan and was subsequently succeeded by the great Taiko Hideyoshi, the dashing disposition and the extravagant taste of the people strongly tinged the different lines of art. But this *zeitgeist* and its consequent effect on fashion was, in some measure, counteracted by the prevalence of *chanoyu* ("ceremonious tea-making" —an art which, under the strenuous encouragement of Hideyoshi and the devoted enthusiasm of those who took interest in it, attained to a high degree of artistic excellence. It even affected the style of architecture and industry.

In this period the paintings of Kano Yeitoku were characterized by strong force and free use of his brush, and brilliancy of color. His works were immensely admired by the warrior class and used in decorating magnificent edifices. He had three disciples: Sanraku, Koyetsu and Yusho. Koyetsu first modified the style of the old Tosa school and made a style of his own. Furthermore, he improved upon *makiyé* (gold and silver lacquer) by his noble and unique designs, and his representations of popular scenes promoted the oncoming of the *ukiyoyé* school.

In architecture, Hideyoshi's two castles, Momoyama and Juraku, were the most magnificent. The daimyos, too, took pride in the splendor of their castles. The construction of Shinto shrines also was gradually improved, until what was called the *yatsumuné-dzukuri* (buildings consisting of eight edifices, large and small) edifices was invented. It has been charged that the Buddhist temples of the Shin sect are wanting in solemnity, but in magnitude they are seldom equalled. In the construction of tea-rooms the greatest elegance of taste was displayed, and gardening, too, underwent a favorable change. In sculpture there were few great productions, except those that were employed in ornamenting buildings. The latter part of this age, however, brought forth the famous sculptor Hidari Jingoro. It may be worth mentioning that remarkable skill was exhibited in the carving of No masks. As to manufacturing art, apart from the encouragement afforded by the extravagance of the daimyos and the general prevalence of tea-making, the great influx of foreign articles through the merchants of China, the Malay Archipelago and Western countries stimulated the progress of all branches of Japanese art.

TENTH PERIOD.

The First Period of the Tokugawa Shogunate (1615–1744 A.D.).— With the firm establishment of the Tokugawa's supremacy, the literature and art of Japan took a long stride; and as the empire had enjoyed tranquillity for many years people in general became effeminate and weak-spirited through excessive devotion to literary pursuits, while the plebeians raised the condition of their living owing to the growth of their wealth. The result was that the fashion and the taste of those days were, to a great extent, modeled by the fancy of the lower but comparatively rich plebeians. Accordingly, art and industry gradually departed from their old fashion of grandeur and magnificence, and assumed milder and plainer aspects.

At the beginning of this period, however, the trace of the foregoing age was still perceptible; for even in the vivid *ukiyoyé* painting of Matabei and the superb style of Sotatsu's decorative pictures there was a touch of vigor and grandeur. But as the age gradually ripened and fancy deepened the so-called Genroku fashion unfolded all its glory.

Among the artists Tannyu held a very prominent position. He studied both Chinese and Japanese art and formed a novel style distinguished for the broadness of subjects and plainness of treatment, while Naonobu, Yasunobu and Tsunenobu contributed to extending the influence of his school. Sansetsu, remaining in Kioto, faithfully preserved his ancestors' style; Mitsuoki improved upon the old Tosa style by blending in it the brush of the Chinese masters; Jyokei and his son Gukei revived the Sumiyoshi school; Hanabusa Itcho, choosing his themes in the scenes of daily life, depicted light and charming pictures; Motonobu with his peculiar beauty and grace of treatment secured the foundation of the *ukiyoyé* school. Choshun, Kwaigetsudo, Masanobu and Kiyonobu formed a group by themselves, while Sukenobu worked independently. Korin, the great genius and unequalled decorative painter, applied his art to lacquer work, while his younger brother Kenzan achieved the highest fame for his graceful paintings on porcelain wares.

In this age sculptors chiefly put their efforts into microscopic details; hence diminutive works of rare merit — such as *Netsuké* — were produced, but larger works like Buddhist statues continued to decline. Of the sculptors who made a specialty of carving Buddhist statues Tankai Risshi and Shimidzu Riukei alone were celebrated. Carving came to be widely used in the decoration of buildings, but the style grew too complex.

In architecture, a new mode of construction called the "gongen-tzukuri" found its rise.

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1 Gateway to Shinto Temple, Kamakura

2 Bronze Buddhas and Pagoda at Asakusa, Tokio

1 Buddhist Temple, Asakusa, Tokio

2 Interior of the Chinese Buddhist Temple, Yokohama

This mode had more tendency to monastery style than the *Yatsumune-tzukuri*, the former being an advance upon the latter. However, though it surpassed the older styles in sectional detail, it lost in general sublimity. The temples at Nikko and Uyeno best reflect the type of that age. Side by side with the growth of luxurious taste among the people and of scientific and technical progress, all other lines of art and industry attained to hi her excellence.

ELEVENTH PERIOD.

The Second Period of the Tokugawa Shogunate (1745–1867 A.D.).— When Iyeshigé, the Ninth Shogun of the Tokugawa House, entered upon his office, the general fancy in Yedo had tended toward greater pomp and vulgar splendor; but in Kioto quiet and chaste literature and art rose into ascendency, and the two capitals presented a strange contrast. The Kano school, adhering to its old rules with overstrictness, was, as it were, fossilized, and produced no fresh masters; but *ukiyoyé* gained greater popularity, and its masters, Shunsho, Harunobu, Utamaro, Toyokuni, Keisai and many others, competed with one another in painting bright and attractive pictures. Indeed the demand for their works was such that it called forth the invention of color-printing from woodblocks. Hokusai enlarged the range of painting, and covered with his skill all objects of natural and social existence. Hiroshigé was renowned for his landscape painting, and the pictures he depicted for woodcut reproduction had a peculiar charm. Shiba Kokan imitated European painting and also made some attempts at copper-plate pictures.

The influx of Ming and Ching institutions affected the Kioto artists. Ginankai, Chitaiga and Shabuson were renowned adherents of the Southern school, and it was by their stimulation that the celebrated Maruyama Okyo founded his realistic school, thus making quite a new phase in the art of Japan. Goshun, originally a pupil of the Southern school, opened the Shijo school. Besides them, Shiseki, Shoko, Jakuchu, Sosen, Ganku, Zaichu, Chikuden more or less copied the style of Ming and Ching painting. By and by their art influenced the artists of eastern Japan as may be observed in Buncho and Kwazan. Toward the end of the Shogunate, Totsugen and Ikkei and some others revived the old Tosa school, and from it Yosai's brush supervened. In industry, the simple articles fashioned after the taste of literary men came into popularity, whereupon many artisans took their models in Ming and Ching manufactures.

TWELFTH PERIOD.

The Age of the Grand National Metamorphosis (1868–A.D.).— The advent of the Meiji Restoration completely destroyed the feudal system and swept away the old atmosphere. The country was thrown into the midst of the world's great tide, and the general commotion arising therefrom was so violent that both art and literature fell into a temporary lapse. Soon, however, as the Imperial rule manifested its beauty, they once more commenced activity and progress, and are now ready to make a bold flight. It was only half a century ago that this old island empire had the grand national metamorphosis. But in that short space of time the nation has digested every department of Western civilization with such admirable skill as to surprise the whole world. Yet, whatever the material progress of Japan may have been, her art and literature are still in a state of transition, and it is impossible to foretell their future. We have no doubt, however, that the nation will blend all the best points of the East and the West with the signal success which has marked its past efforts, and bring out a new product of indescribable value, though we are aware the completion of such a task must necessarily require the labor of many a long year.

The first artist to come into the new atmosphere was Kano Hogai, and Hashimoto Gaho followed in his wake. The latter studied old masters and developed a new style. From the Shijo school Kono Bairei and Kawabata Gyokusho rose, of whom the latter is trying to devise some novelties. Shibata Zeshin was an artist of rich originality, while Kishi Chikudo's *forte* was painting from nature. Noguchi Yukoku and Taki Kwatei were eminent artists of Southern school; Takemura Koun and Takuchi Kyuichi are noted for their original style in wood-carving, and Ishikawa Komei for his ivory work. European painting and plaster casting have made some progress. The architects have successfully introduced the European mode of house-building with bricks and stone, while they continue the proper Japanese style of building with wood.

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15. JAPANESE ARCHITECTURE. The architecture of Japan, like that of China from which it is derived by way of Korea, is wholly distinct from any of the styles of southern or western Asia. It was brought to Japan in the 6th century of our era by Korean Buddhists; there appears no trace of any precedent indigenous style. As developed by Japan from this imported type, it has persisted until the present time.

Characteristics.— Superficially, Japanese architecture appears to be a single style, on account of certain characteristics which run through all the periods; on closer examination these periods are distinguishable by their details and ornament, as well as by subtle differences of taste. Like the Chinese and Korean, it is an architecture of wood, employing this material with such refinement and dignity as to exalt it to an artistic and monumental importance which it has nowhere else attained. While stone is used for terraces, stairways and embankment walls, and — singularly enough — for decorative lanterns as architectural adjuncts, the entire structure of temples, gates or *torii*, towers or pagodas, houses and palaces, is of wood. Even stucco appears only in rare instances. The most distinctive feature is the roof, gabled or hipped, having invariably a concave-curved sweep, with very wide eaves upturned at the corners. The supporting structure consists of heavy posts, square or round, carrying equally heavy girders framed into them, which in turn carry an elaborate and complicated framework of brackets and ties. The principle of the truss supported at

the ends is not recognized; that of the cantilever appears in the bracketed construction, which rests directly on the main posts and girders. A central mast is an essential feature of every pagoda. Superposed stories are in retreating stages, each marked by a tiled roof forming wide-projecting eaves. All wooden members are mortised or halved into each other, without nails or pins. Sheet-metal collars of copper, silver or bronze often decorate the points of junction. The wood is highly finished and left either of its natural color, or lacquered in red, black or other colors, especially in temple interiors. All roofs are tiled with gray, dark green or red tiles. There is no wall-design, properly speaking: temple structures are generally open; domestic buildings walled only with wooden panels and paper shutters, except in rare instances of palaces and castles which have plain plastered walls. The masonry of terrace walls is finely executed, but the principles of jointing employed in the West are not followed, and the masonry is, on the whole, the least successful part of the architecture, though never failing in the picturesque quality. In some of the Tokugawa castles, however, stones of huge size were employed, rivaling those of Baalbek in Syria.

Periods.—The Korean style, called *Shichido Garan,* lasted from 580 to nearly 800 A.D.; it was at first purely Chinese in character, and has left in excellent preservation the beautiful pagoda and *hondo* (temple hall) at Horiuji (580 A.D.), the Sanjuto at Hokiji (about 646), and monasteries, much rebuilt, at Horiuji, Nara and Osaka. The noble Yakushiji pagoda near Nara (680 A.D.) represents the Japanese modification of this style, which declined after 725, leaving only a few small and simple temples (Todaiji, Shinyakushiji, etc.). This style is marked by the purity and refinement of its curves, the grace of its proportions and its internal simplicity.

The *Helan* period followed with the transfer of the capital to Kioto, in 782, by the Mikado Kwammi, and was marked by a new impulse from China direct, with a great increase in decorative splendor. Its one extant unmodified monument is the Ho-o-do at Uji, built as a villa but later converted into the «Phœnix Hall» of the temple Byodo-in, remarkable for its beautiful lines and its internal splendor, especially for its coffered, carved, lacquered and inlaid ceiling. The Enriakuji on Mount Shiei and the Chion-in at Kioto have been largely rebuilt.

Ashikaga Period.— From the end of the 12th to the end of the 14th century confusion reigned under the Fujiwara shoguns, who were succeeded by the greatly Ashikaga dynasty, and the capital was transferred to Kamakura. Art revived under a second Chinese influence. The dominant style was that of the *Zen* Buddhist temples and palaces. The temples were without pagodas, the hondo was square and lofty, accompanied by a complex group of monastic dependencies; the palaces were of singularly elegant design, if we may judge by two extant pavilions at Kioto — the celebrated Kinkakuji and Ginkakuji (15th century).

Tokugawa Period.— In 1603 the great Iyeyasu established the Tokugawa dynasty, with the capital at Yeddo (Tokio), and ushered in the policy of exclusion and isolation (1635–1853), and of the military feudalism of the daimyos. The ancient Shinto religion was revived, and architecture took on a hitherto unexampled splendor of decoration, exemplified by the gorgeous temples at Nikko, Suba or Shiba and Uyeno. The judgment of critics is divided as to the merits of the Tokugawa style; the general verdict is that purity of line and refined simplicity of form were exchanged for complexity and magnificence of detail, but the beauty and impressiveness of the result are admitted by all.

The Japanese divide the Shinto temple architecture into 10 sub-styles (Oyashiro, Otori, Sunnyoshi, Kibitsu, etc.); but only a Japanese expert can distinguish them. The great majority of extant temples are of this religion and period, and many of them extremely beautiful, as much by their surroundings, terraces, gardens, *torii* or gates and dependencies as by the lacquer, carving, metal adornments and bracketing of their interiors. Many have pagodas like the Buddhist temples (e.g., at Nikko, built 1810–18). The Tokugawa palaces or castles (*yashiki*) are imposing compositions, despite the light construction of their central or residence buildings in wood and plaster. The terraces of massive masonry, the gateways, the concentric courts about the central dominant *nagaiya,* are well exemplified by the castles and palaces of Himeiji and Osaka, of Hikone and Kumamoto, and by the Nyo-rikyo and Katsura-rikyo at Kioto. The ordinary Japanese house is a charming but frail structure of frame, with rooms divided by fixed or sliding panels of wood and rice-paper. Each room is planned to fit a given number of mats of three by six feet, and the chief room has a recess or alcove for the daily display of a single kakemono, vase or other choice work of art, taken from the *godun* or fireproof storeroom. There is no distinction of type of rooms for special functions or uses. The present-day architecture of Japan is being unhappily influenced by Western models, especially in commercial buildings.

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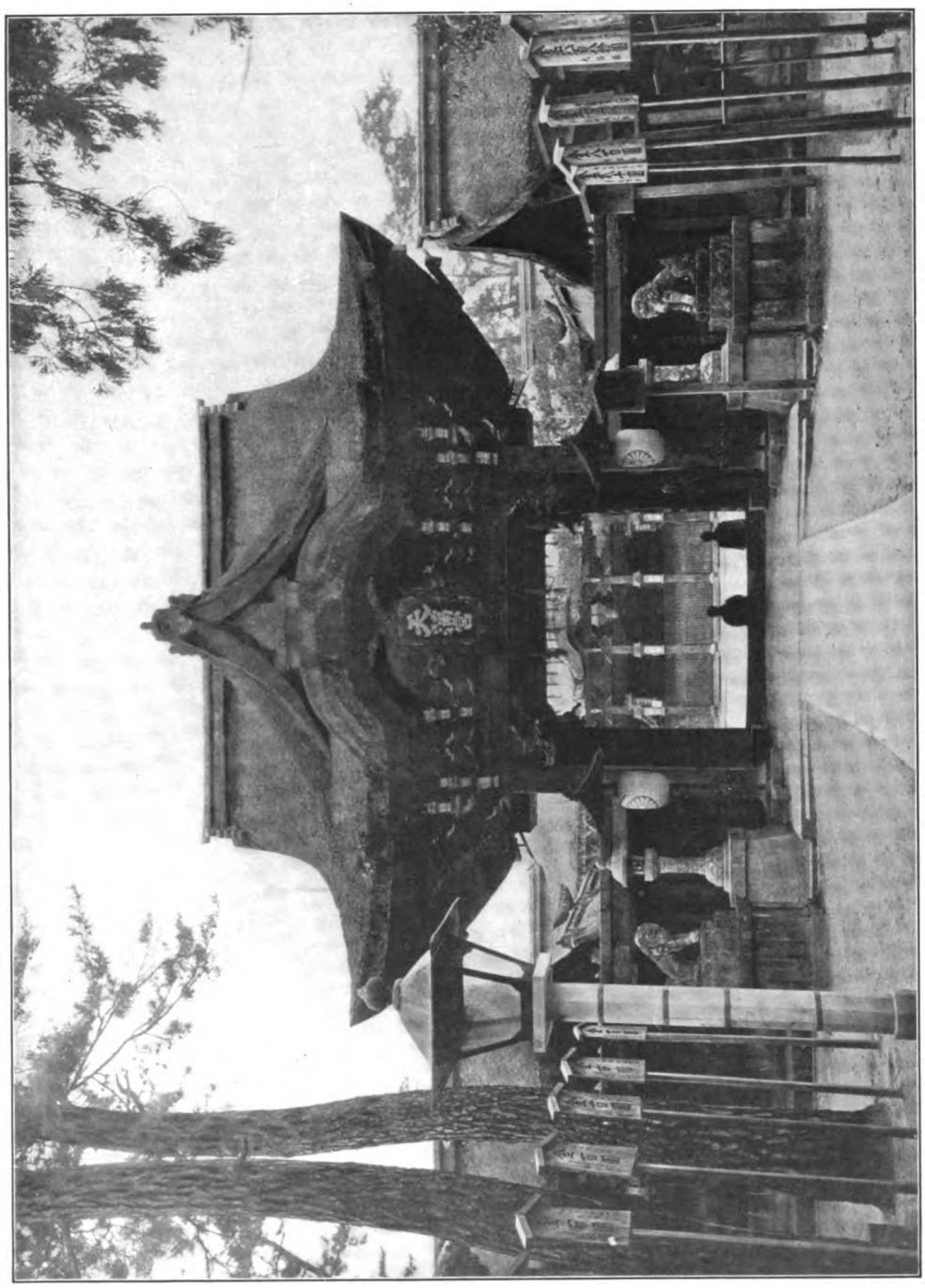
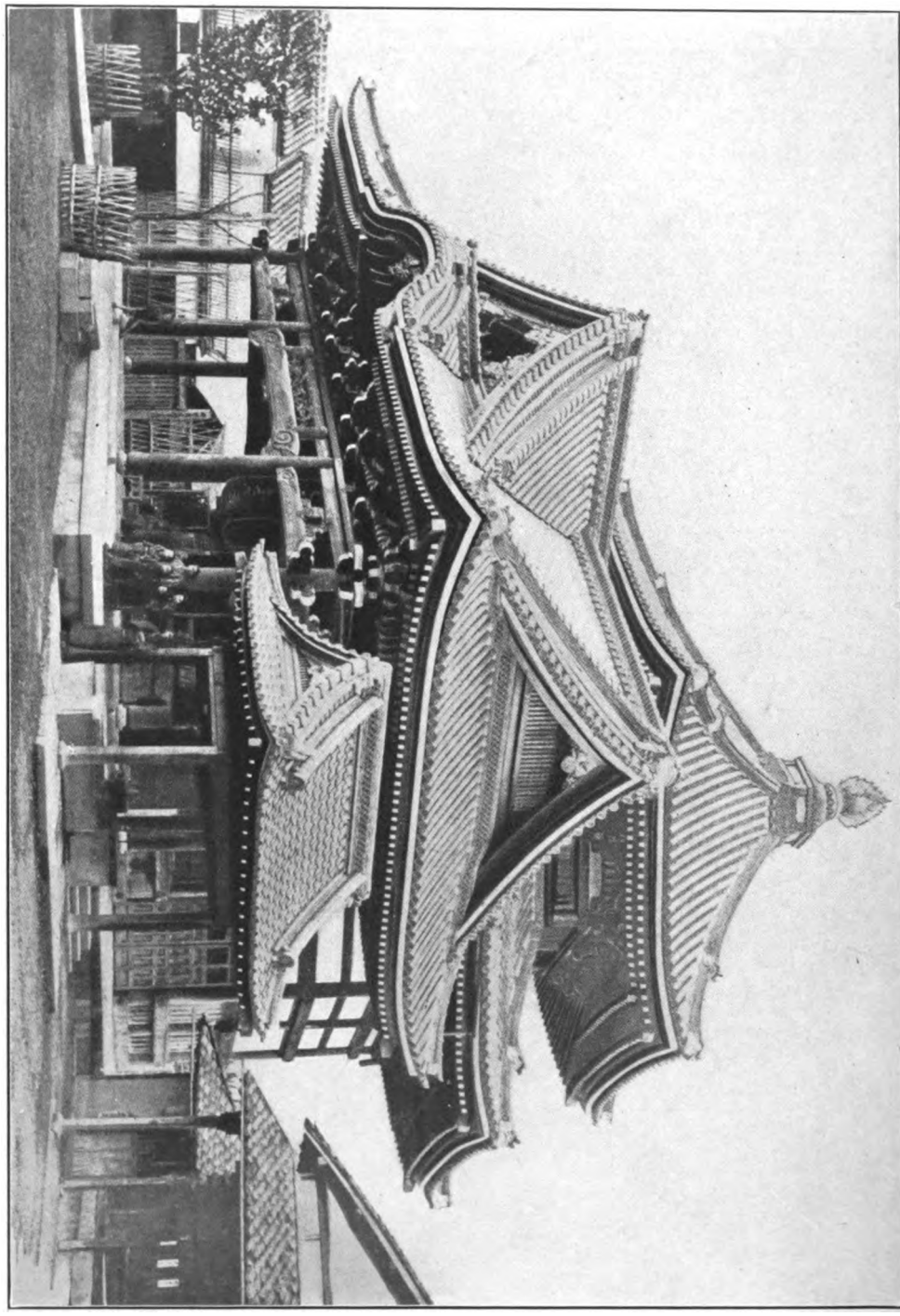
16. FINANCE AND COINAGE SYSTEM IN JAPAN. Introduction.— After the Restoration, 1868–71, Japan passed through many sudden and sweeping changes in her political and social affairs. Feudalism was abolished in favor of the centralization of government, to be succeeded by a representative form of government; the nation was engaged in civil wars and also passed through two foreign wars. In financial matters, too, the changes that oc-



Gate of the Golden Temple, Tokio



Hectagonal Temple, Kioto

curred were both important and memorable. The adjustment of the land system and the reform of land taxation, the adjustment of hereditary salaries of Daimios (feudal lords) and Samurais by means of public loans, the unification of the business of the state treasury, the reform of various taxes, the adjustment of paper currency and the adoption of the gold standard were among the most important of the changes. Of these this article will treat chiefly the adjustment of the paper currency, and the adoption of gold standard, as they were the most important and difficult tasks of all. The adoption of gold standard was one of the most important measures to bring this country into the international circle of common economics. A treatment of these two topics will take us over the general view of currency system in modern Japan.

How the Paper Money Came to be Issued. — The coinage system in vogue at the time of the Restoration (1868) was based on the system that was first established in the 6th year of Keicho (1600 A.D.), and continued to prevail for upward of 260 years until the end of the Tokugawa régime. The Shogunate government, however, frequently resorted to recoinage in order to relieve its growing financial difficulties, invariably making the coins lighter in quantity and poorer in quality. Some of the Daimios, too, took the liberty of secretly coining money, while, with the permission of the government, some of them also issued paper money. The consequence of all these irregularities was that the currency system of Japan at the end of the Shogunate government was in a most disorderly condition.

Soon after the Restoration, the Imperial government resolved to reorganize the existing system of coinage on a sound basis, and in 1871 set itself to the task of reminting all the old coins. A gold standard was adopted, making one yen gold the standard unit. It consisted, after the American system, of 90 per cent of pure gold, its weight being 25.72 grains. A one yen silver coin weighing 416 grains, 90 per cent of which were silver, was also issued to be exclusively used at the treaty ports. In this way, although a gold standard was adopted, yet as a matter of fact it could not be operated in a satisfactory manner, owing to the over-issue of paper money and other circumstances then prevailing. Besides, as Mexican silver dollars were generally used as the medium of exchange in the trade of the Far East, it was found impossible to maintain the gold standard in Japan. Under the circumstances, in 1878 the government allowed the use of the one yen silver piece as legal tender throughout the country, the circulation of which had formerly been confined to the limits of the treaty ports. The result was that the monetary system of Japan became bimetallic, and after the adjustment of inconvertible paper money it became a *de facto* silver standard.

Government Paper Money in the Early Years of Meiji.— In 1869 and the year following the government was financially in a very difficult position. This was mainly due to the heavy expenses it had to meet in connection with the revolutionary wars, when there was scarcely any fixed source of revenue to rely upon. In order to relieve this financial distress, in 1868 the government issued paper money called Kinsatsu (literally, gold notes). Then again, when in 1871 feudalism was abolished, the government had to take over all the paper money which had been issued by different Daimios. In order to adjust this class of paper money and owing to several other circumstances, the government was obliged to issue further large amounts of paper money from time to time, until about the end of 1876 it totalled 93,000,000 yen.

The credit of these paper notes was at first exceedingly bad. In Tokio and Osaka, the price of the new paper money was at one time more than 60 per cent below the specie, while in other localities it could not be circulated. This was mainly due to the fact that the various kinds of paper money issued by different Daimios had already much depreciated in value, there having been even cases where they were disowned by the governments which had issued them. Moreover, the new government was not as yet established on a firm footing, while the paper money was issued with neither the security for conversion nor within reasonable limit. It is not at all strange that the general public placed little confidence in the new paper currency.

In view of such a state of things, the government endeavored to facilitate the circulation of the paper currency by every available means. Expostulations and threatenings were resorted to and then an order to pay taxes in the paper money was issued. It was even proclaimed that a person who would take premium in the exchange of paper with specie should be fined or imprisoned. Despite all these measures, the government could not keep up the price of paper on par with specie. So in December 1868, the government was obliged to make public recognition of the difference in price of paper and specie. This, however, only had the effect of still lowering the price of paper, and the government withdrew the measure in April of the following year. In May of the same year the government shortened the period of circulation of the paper notes to five from the original 13 years, and pledged to regard them, if they remained in circulation after the expiration of that period, as government bonds bearing 6 per cent interest, besides announcing to the public the means of redemption and the amount of issue. These measures, however, were not satisfactorily carried out. But as the prestige of the new government gradually came to be fully established, the credit of the paper money increased, and about 1872 the people even came to prefer it because of the convenience of handling. In fact its price became even higher than specie.

The Over-Issue of Paper Money Owing to the Rebellion of 1877.— Matters were progressing favorably, when in 1877 a rebellion broke out in the southwestern provinces of the empire. In order to defray the expenses of this civil war, the government was obliged to issue 27,000,000 yen of paper notes. Thus the amount of the paper money in circulation suddenly increased, until in January 1879 it reached the maximum amount of some 120,830,000 yen.

The Issue of Reserve Paper Money.—Although these paper notes were issued by the government with the intention of withdrawing

them after a fixed period, yet practically they became a sort of permanent debt; and besides them the government provided itself with reserve paper notes, which were issued whenever it found itself in want of money, withdrawing them as soon as revenues were obtained. This extraordinary issue of reserve paper money gradually increased in amount, so that after 1878 the average yearly issue reached 20,000,000 yen.

The National Bank Notes.— Besides the kinds of inconvertible notes, mentioned above, there was another kind of inconvertible paper, namely, the national bank notes. When in 1872 the government pledged to redeem paper currency in five instead of 13 years as originally fixed, it adopted a scheme of establishing national banks with power to issue convertible notes, these notes to be issued on the strength of the government bonds deposited in the Treasury Department. With this object in view the National Bank Regulations, modeled largely after the system then in vogue in the United States, were proclaimed. According to these regulations, a national bank was to have a capital of at least 50,000 yen, and was first to bring to the government paper money equal in amount to six-tenths of its capital, for which the government was to deliver in exchange the same amount of the Kinsatsu-Exchange bonds bearing 6 per cent interest, and these the bank was again to take to the government to be deposited as security for the same amount of the convertible bank notes to be delivered; four-tenths of the capital was to be in specie and kept as reserve for the conversion of these notes. The government intended to retire all the government paper money hitherto issued in exchange for these notes, but unfortunately that intention could not be carried out. For the specie was getting daily more scarce so that as soon as the convertible bank notes were issued, so much demand was made on the banks for exchange, that these notes never obtained any extensive circulation. Thus only four national banks were established, which issued some 2,000,000 yen of convertible notes between them. In 1876 the government issued some 174,000,000 yen of the Hereditary Pension bonds to take the place of the annual pensions of the Daimio and Samurai classes, hitherto paid in rice. The government intended that these bonds should be made the capital of national banks and that those banks should be authorized to issue notes. In this way, it was believed that the Samurai would obtain a means of livelihood, while the economic market would be supplied with the much needed capital in the form of bank notes. With these ends in view, in August 1876, the government made certain amendments in the National Bank Regulations, so that it now became possible to establish a national bank with power to issue notes without specie reserve at all. To be particular, the total amount of notes which the national banks might issue was limited to 34,000,000 yen; a bank might place as deposits in the government treasury any kind of government bonds bearing interest at 4 per cent and upward, to the amount equaling eight-tenths of its capital, in order to be able to issue bank notes equal to the amount of that deposit; at the same time the required conversion reserve for the notes issued was reduced to but two-tenths of the capital, and moreover this might be in any kind of currency. Thus the national bank notes were changed from being convertible in specie, into being convertible in currency; and since the currency of the time was inconvertible government paper money, these bank notes, too, became another kind of inconvertible paper money.

The establishment of national banks having thus become quite easy, many were soon established, and in April 1880 the notes issued by them reached the maximum amount of 34,420,000 yen.

In these ways, the amount of inconvertible paper money in circulation rose step by step, until it reached its highest point in January 1880, as may be seen from the figures given below:

	Yen
Government paper money	113,831,709
Reserve paper money temporarily issued	22,188,116
National bank notes	34,137,652
	170,157,477

The Policy of the Government Toward Inconvertible Paper Money About 1879.— One result of such over-issue of inconvertible paper money was the difference in price of silver and paper, which began to manifest itself at the beginning of 1877. At the close of that year the ratio between silver and paper became as much or more than 1 yen and 21 sen of paper to 1 yen of silver. The general public began to pay attention to the disposal of the paper money. The government, too, recognized the necessity of taking measures to redeem the government bonds and paper money, and in August 1877 drew up a plan aimed at the redemption of the paper money within seven years, publishing it in July of the following year.

An opinion, however, prevailed both among the authorities and the general public that the differences in the value of paper and silver were due not to the depreciation of paper, but to the appreciation of silver, and the government made efforts to prevent the rise of the price of silver rather than to redeem the paper money. Thus, when in March 1879, the difference between silver and paper became 1 yen and 26 sen of paper to 1 yen of silver, the government induced the First, Second, Mitsui and Specie banks to sell out silver coin. The measure was unsuccessful in so far as it temporarily checked the rise of the price of silver, but no sooner was the sale of silver coin suspended than the paper money further depreciated. As it was, the government abandoned the measure in September 1880.

The government also opened a place for transacting the exchange of Mexican dollars at Yokohama with the purpose of facilitating the sale and purchase of silver and of preventing thereby the rise of the price of silver. Further in February 1880, the government established the Yokohama Specie Bank, contributing one-third of its capital, with the object of inviting people to invest hoarded coins, so that these coins might be supplied to the financial market. The Specie Bank was, moreover, to engage in foreign exchange in order to facilitate monetary circulation between Japan and foreign countries.

All these measures, taken with the object of checking the rise of the price of silver, having

failed, the government ultimately resolved to set itself to the task of redeeming paper money in earnest. In September 1880, the government doubled the rate of tax on saké, so that the increased revenue to the amount of 5,000,000 yen a year might be set apart as a redemption fund. Again, the government extended the spheres of local taxation, correspondingly lightening the burden of the central government, and at the same time the government expenditures were much curtailed, the surplus obtained in all these ways being also added to the redemption fund. Besides all these, the government decided gradually to transfer by sale to private hands the government factories, which had been established for the encouragement of industry; stopped making loans to companies and individuals out of the reserve fund in the Treasury; and every yen thus gained went to increase further the amount of the redemption fund.

Yet the depreciation of paper did not stop. In April 1881, 1 yen silver brought on an average 1 yen 80 sen of paper, this being the lowest point ever reached in the depreciation of paper money.

The Effects of the Over-Issue of Inconvertible Paper Money on the Finance of Japan.— Before 1877, the over-issue of inconvertible notes resulted only in the excess of imports over exports and the efflux of specie from the country, but after that year, as the amount of inconvertible notes issued suddenly increased, not only a great depreciation of paper and a faster and greater efflux of specie followed, but prices rose with abnormal rapidity. This was especially the case with the price of rice, which rose by 98 per cent in 1880 and 1881 compared with that in 1877. The rate of interest also rose by more than 4 per cent on an average in those days, it being possible to buy government bonds bearing 7 per cent interest at a price more than 30 yen lower than their face value. The bad effect of such a state of things was felt in various directions. The revenue of the government was practically reduced to one-half in value of what it had been, and the people who lived on fixed incomes suffered greatly owing to the sudden and considerable depreciation of their incomes. The rise of the price of rice swelled the incomes of farmers, who constituted a great majority of the inhabitants of the empire, with the result that they contracted habits of luxury. The imports exceeded the exports more and more and gold and silver left the country in ever-increasing quantity. As for the industrial and mercantile classes, they were simply bewildered at the sudden and frequent fluctuations of prices and instead of engaging in honest business, hoped and struggled to reap profit by speculation. In fact the financial market of those days was apparently in a very prosperous condition, but it was actually on the brink of ruin. This may be judged from the fact that whereas the export trade of the country increased 62 per cent in the five years between 1872 and 1876, it increased by only 28 per cent in the same length of time between 1877 and 1881.

The Adjustment of the Inconvertible Paper Currency.— In the autumn of 1881, a great split took place in the government, and as a result the present writer was transferred from the chair of the Minister of Home Affairs to that of the Minister of Finance. It was just the time when the depreciation of the paper money reached its lowest point and both the government and people were in a most uneasy mood. It was found that the amount of the government paper and of the bank notes in circulation at that time stood as follows:

	Yen
Government paper money	105,905,211
Government paper money temporarily issued out of the Paper Money Reserve	14,500,000
Notes issued by National Banks	34,398,030
Total	154,803,242

All these were inconvertible paper money. The government decided that unless some drastic measures be taken to dispose of them the state finance would soon come to ruin. It became clear in the eyes of the financial authorities that to accomplish the adjustment of the inconvertible paper money there was no other way than that side by side with the redemption of a portion of the paper money in circulation steps be taken to increase the specie reserve of the government preparatory to the resumption of specie payment. It was at first intended to adjust and redeem all the inconvertible notes issued by the government and national banks once for all, and establish a central bank having the sole privilege of issuing convertible notes. With that intention, investigations were made into the actual financial condition of the government. It was found that 7,000,000 yen could be annually appropriated from the ordinary revenue of the government toward the redemption of paper money and that there was a reserve fund amounting to about 55,000,000 yen. Of this sum about 19,000,000 yen had been loaned out, so that the amount at hand was but 36,000,000 yen. But as about 25,000,000 yen out of this consisted of bonds and 2,000,000 yen of bank shares and paper money, the amount of specie was no more than 8,000,000 yen. Further, even this amount existed in the account book only, for out of this, 3,000,000 yen were loaned out to certain foreigners, so that the amount of specie actually available for conversion was only about 5,000,000 yen. Nevertheless it was firmly believed that by utilizing the balance of revenue above referred to, and also by employing this specie reserve to advantage, the government should be able to carry out its scheme of redeeming paper money in about five years.

In some quarters it was opined that it was unwise to accumulate and store specie, because specie would of itself naturally flow in if the paper money should be withdrawn and the currency decreased. Anticipating, however, the great difficulty that would attend the realization of the scheme of convertible notes, the government adhered to the policy of accumulating and storing as much specie as possible.

The task of doing this, however, was not an easy one. The amount of the specie that remained in the country on those days was extremely small, while the yearly output of gold and silver mines in the country was less than 400,000 yen. Moreover, bound up by the treaty, the government could not revise tariff to its advantage. On the other hand in view of the financial condition of the time, the country would suffer great disadvantage if foreign loans were resorted to. Under these circumstances the government came to the conclusion that the

only way open was to try to bring in gold and silver from abroad by means of discounting foreign bills of exchange accompanied by securities, and accordingly this scheme was adopted though there was no little opposition within the government itself.

It indeed required a great determination on the part of the government to accomplish the adjustment of the paper currency; for it was apparent with the rise in the value of paper money the prices would fall, leading to the disappearance of the seeming prosperity of the country which then prevailed. Loud voices would naturally be raised against this policy from all quarters. To make it sure that no opposition would ever stop the carrying out of the government's scheme, the emperor's special sanction for this scheme was obtained.

The Adjustment of the Reserve Paper Money.—The first task was the adjustment of the reserve paper money. As before stated, the reserve paper money was issued for temporarily meeting the deficit of revenue. It was thus not of a permanent nature, but all the same it had the evil result of increasing the amount of circulation of inconvertible notes.

In order to withdraw from circulation the amount thus utilized from the paper money reserve, certain changes were made in the method of making receipts and disbursements of the public revenue, as well as in the method of disbursing the expenditures of the government departments, so that thenceforth these disbursements were all made at the exchequer, instead of having the amounts of the estimated expenditures turned over in lump sums to the departmental authorities in the early part of the fiscal year, as had been done before. These changes were effectual in giving the Treasury available funds. Yet further steps were taken toward the increase of the government reserve by withdrawing the loans made out of the government reserve (in aid of industrial enterprises) and by selling the government bonds which were held by the Reserve Fund. The increased specie in the reserve obtained in this way was temporarily utilized as well as all the available funds in the Treasury for the withdrawal from circulation of the reserve paper money, the task being accomplished in January 1883. After this, whenever the government was temporarily in need of funds, they issued short-term public loans in the form of the Treasury bills. The Treasury Bills Regulations were issued in September 1884.

Economy in the State Expenditure and the Redemption of Paper Money.—The adjustment of the troubles connected with the temporary issue from the Paper Money Reserve was comparatively easy. But with regard to the adjustment of the troubles which existed in connection with the paper currency proper, the task was very much greater.

As was stated above, in October 1881, when the writer was appointed Minister of Finance, it was found that about 7,000,000 yen could be appropriated annually out of the ordinary revenue for the redemption of paper money. In order that this surplus should not be spent for any other object, the government decided that the state expenditures should not be further increased for the three years after the year 1882.

During the period just mentioned, however, the government had to defray considerable extraordinary expenditures owing to the outbreak of cholera throughout the country, the occurrence of troubles with Korea and the consequent expansion of armament, and some other affairs. Besides, after 1882 on account of the general dullness of trade, the government revenue markedly decreased. For instance, in 1883 the revenue decreased by as much as 2,000,000 yen in saké tax alone. Thus having found it impossible to carry out the prearranged plan, the government took measures to increase its revenue by means of new taxes. Thus in 1882 the government first levied stamp duties on patent medicines, and license tax on the brokers of the rice-exchange and the stock-exchange, and revised saké and tobacco taxes; and in 1885 taxes on soy and confectionery were levied for the first time. Part of the surplus of the revenue which was secured through these means was devoted to the redemption of the paper money, while the remainder was added to the reserve fund with the object of employing it for securing the importation of specie from abroad. The amount employed in these ways for the adjustment of the paper money during the five years from 1881 to 1885 was as follows:

	Yen
The amount directly employed in the redemption of the paper money	13,640,000
The amount added to the reserve fund	26,466,828
Total	40,106,828

The direct redemption of the paper money with part of the surplus of the revenue was made only till 1883. It was abandoned after 1884, as the difference of paper and silver in price disappeared, and all the surplus of the revenue was added to the reserve fund.

The Discounting Operations of Foreign Bills of Exchange and the Accumulation of Reserve Specie.—The reserve fund so frequently referred to above originated in the government's learning, through the trying financial experience of the first years following the Restoration, the importance of creating a fund during normal times, and also because there was the need of such a fund to enable the government to resume specie payment. The fund was commenced and efforts were made to augment it by investment. In 1878, 20,000,000 yen were set aside as the sinking fund, out of the reserve fund, with the purpose of investing the amount in government bonds in order to apply the interest accruing therefrom to paying off the principal and interest of the public debt. In 1881 the total amount of the reserve fund possessed by the government was more than 55,000,000 yen, the reserve fund proper and the sinking fund being counted together. In August 1882, the government decided to purchase specie with the government bonds constituting the sinking fund, and since then the sinking fund existed in name only. As the amount of specie in the reserve fund which was possessed by the government in 1882 was only about 5,000,000 yen, the attempt was now made to increase it with the specie obtained by discounting foreign bills of exchange.

It was in 1880 that the government first engaged in transactions connected with foreign bills of exchange by establishing the Yokohoma Specie Bank and entrusting to it the sum of

3,000,000 yen in order that it might discount foreign bills of exchange on the security of exported goods, at the request of mercantile companies engaged in the direct export trade. The main object of thus engaging in discounting foreign bills of exchange was to encourage, on the one hand, the direct export trade, and on the other to secure specie — it being the object of the government to use the specie thus obtained in paying off its foreign expenses. In those early days, however, the business connected with the foreign bills of exchange being entirely new, and the whole thing being mismanaged, there arose various evils connected with it, so that the result was far from accomplishing the object sought. The government thus not only failed to accomplish the absorption of specie, but had even to sustain losses, owing to the fact that the advances made often remained unpaid long after the expiration of the term of maturity. The causes of this failure on the part of the government, in its first experience connected with foreign bills of exchange, appear to have been: (1) The laxity in the inspection of goods before discounting the bills of exchange, so that goods of inferior quality were sent abroad which did not command the expected price. (2) The business connected with the disposal of exported goods being mismanaged, led to uncertainties and irregularities in their sales, causing delay in the payment of bills. (3) Since the money advanced in discounting the foreign bills of exchange was in paper money, it was arranged that the collection of those bills abroad should also take place in terms of paper money; so that the price realized abroad on the goods exported was, in paying for these bills, converted into the terms of paper money according to the rate of exchange prevailing at the time. And this process took place at a time when the paper currency was rapidly depreciating. As a result, the export merchants became engrossed in the subjects of fluctuations in the value of paper money — regarding their business as one of speculation rather than of sober, legitimate transaction, in the hope of realizing certain chance profits from the fluctuation of paper money.

Accordingly the system of discounting foreign bills of exchange was revised so as to do away with the above-mentioned evils and the revised system was put into operation after March 1882. The following were the chief points of revision: (1) The Specie Bank to make a very strict examination of the goods on whose security the bills were discounted. (2) The Japanese consulate at the place whither the goods were sent to be entrusted with their supervision, so that they were not to be delivered until after the payments were made for the bills of exchange. (3) The bills to be made payable in foreign currency at the rate previously determined in accordance with the rate of foreign exchange ruling on the day of discounting them.

Since these revisions were introduced into the system of discounting foreign bills of exchange export merchants gave up any idea of speculation and ceased to cause losses to the government. Further, in June 1884, the privilege of having the bills discounted was extended to foreigners also. The result was very satisfactory, the amount of specie acquired in foreign countries having markedly increased after September of that year. The government was thus enabled to increase the specie reserve, which was no more than 8,000,000 yen in 1881, to more than 42,000,000 yen at the end of 1885.

Establishment of the Bank of Japan.— Simultaneously with commencing the accumulation of reserve specie, the government felt that in order to effect the adjustment of the paper money it would be necessary to establish a great Central Bank. As before said, the national banks in Japan were patterned after the American system. As a matter of fact there were in 1883 over 260 banks, with their branches throughout the country, which issued paper money to the amount of 34,000,000 yen. But the capital they had at their disposal was generally of small amount. Besides they were established in circumscribed localities, each one within a narrow circle of influence. For this reason the communication between different banks was exceedingly bad, so much so that should there be surplus capital in one bank and another bank be in dire need, yet the former could not help the latter. In order to remedy such a state of affairs, it was thought that there was no better way than establishing a great Central Bank, as in Western countries. It was believed that such a bank would do much to regulate the monetary circulation of the country, simplify the business of the Exchequer, smooth the transactions of foreign bills of exchange and regulate the influx and efflux of specie and bullion. Besides, it was believed that to invest it with the sole privilege of issuing convertible notes was of utmost importance to the adjustment and unification of paper money.

After studying the systems regarding such central banks in vogue in different European countries, the government came to the conclusion that the Belgic system would best serve as a model, and after its pattern a plan was drawn up for the establishment of a Central Bank, called the Bank of Japan, and the main features to be as follows: (1) That the Bank of Japan would be able to facilitate the circulation of currency throughout the country, as it would be in a position to look upon other banks somewhat as its branch offices and open correspondence with them. (2) That the Bank of Japan would be able to increase the strength of national banks as well as of trading or manufacturing companies by means of rediscounting their bills. (3) That the Bank of Japan would be able to lower the current rate of interest, as it would chiefly engage in the business of discounting short-period bills and thereby would facilitate the circulation of capital. (4) That when the business organization of the Bank of Japan was completed, it would be possible to simplify the business of the government by entrusting to the bank a part of the business of the Finance Department, such as the receipt and disbursement of government money and the liquidation of the public debt. (5) That the Bank of Japan might be made an organ of importing and preserving specie by making discounting foreign bills of exchange one of its functions.

The Regulations concerning the Bank of Japan were promulgated in June 1882, and in October of the same year the bank was founded. The main points in these regulations were as follows: (1) The term of business of the bank

to be 30 years. (2) The capital to be 10,000,000 yen. (3) One-fifth part of the capital to be paid in before the bank opened business and the remainder payable in instalments as the bank might require according to its business needs. (4) A limit to be placed on the kind of business the bank may engage in; the risky and dangerous kinds of business to be prohibited. (5) The bank to be entrusted with the receipt and disbursement of government money, so far as it was convenient to the government. (6) While the issuing of convertible bank notes should be considered its rightful privilege, that privilege to be withheld for some time to come. (7) The governor and vice-governor of the bank to be appointed by the government, the former to be of Chokunin rank and the latter of Sonin rank. (8) The Minister of Finance to appoint comptrollers to act as his representatives. (9) The directors and auditors to be elected by the 13 bank's shareholders. (10) The bank to make the monthly report of its business conditions to the Minister of Finance. (11) The government to become the bank's shareholder to the amount of one-half the entire capital of the bank.

It goes without saying that such a central bank should possess the sole privilege of issuing convertible bank notes. But in those days Japan did not possess an adequate specie reserve and the difference of paper and silver in value was exceedingly great. For these reasons the government withheld from the bank the privilege of issuing convertible notes for some time. In return, with the view of making the establishment of the bank easy, the government undertook to take one-half of the entire capital of the bank and also permitted the bank to give 2 per cent more dividends to private shareholders than the government received. In spite of such favorable conditions, the task of inducing the people to invest their money in the bank's shares was not an easy one.

Disposal of the National Banks.— Having thus succeeded in gaining the first step in the direction of the adjustment of paper money— namely, the establishment of a central bank, the government now faced the task of disposing of national bank notes.

Since the national banks had been chartered for 20 years, and that term had not expired, they could not be abolished at once. On the other hand, however, should they be left as they were and abolished at the expiration of the term there was a fear that not only these banks but the country would greatly suffer.

In view of these circumstances the plan adopted by the government was as follows: (1) After the expiration of the term of 20 years each national bank be permitted to continue business, if it so desired, as a private institution. (2) Each bank to deposit with the Bank of Japan a reserve fund for the redemption of notes, money equal in amount to one-fourth the amount of notes issued by that bank and also make a deposit in the same way of a portion of its profit every half year, the amount to equal 2.5 per cent per annum of the amount of the notes issued by it. The Bank of Japan to buy government bonds with that fund in order to spend the interest accruing therefrom for the redemption of notes. If after the expiration of the term of the bank, there yet remain notes unredeemed, that fund be employed for the redemption of such remaining portion of the notes. (3) The Bank of Japan to transact the business of redeeming national bank notes according to the above method and to exchange national bank notes with currency any time the demand is made.

In May 1883, the National Bank Regulations were properly amended and the disposal of the national bank notes was immediately commenced. As described, the accumulation of specie was begun simultaneously with the redemption of the government paper money and the government set itself to the task of disposing of the national bank notes as soon as the establishment of a central bank was accomplished. Thus the time for carrying out the conversion of paper money now approached.

The amount of the reserve specie at the end of 1885 was more than 42,000,000 yen. Of this amount more than 13,000,000 yen were in gold. When this amount was estimated at the current price of silver at that time, the total amount of the reserve specie increased from over 42,000,000 yen to 45,000,000 yen. In consequence, the percentage of the reserve specie was in reality 59 to the amount of the government paper money in circulation, and 37.9 to the aggregate amount of the government paper money and bank notes.

A great difficulty was experienced in accumulating specie on account of the disadvantageous position in which the country found itself with regard to the treaty with foreign countries. By that treaty Japan was entirely circumscribed in the exercise of the power to revise its tariff system, being unable to impose any customs duty on imported foreign articles other than the 5 per cent duty fixed in the treaty. If Japan had been at liberty to increase its customs duty, the government might have increased its revenue and obtained a source of accumulating specie. Besides, it would have made the trade relation with foreign countries advantageous to Japan and given facilities for attracting specie from foreign countries. As, however, Japan was unable to do all these things, a great difficulty was experienced in attracting specie from foreign countries, as in so doing Japan had only to rely upon the means of discounting foreign bills of exchange.

As the amount of paper money in circulation decreased and that of the reserve specie increased, the difference of paper and silver in price gradually became less, until at the end of 1885 it almost disappeared.

The gradual disappearance of the difference in price of paper money and silver brought about various effects upon the financial condition of Japan. Prices gradually fell to their normal standard. The fall of price of rice was especially noticeable. In 1884 it fell to nearly one-half of what it was in 1881. Interest also fell to its normal rate of about 10 per cent which ruled before the over-issue of inconvertible notes, while government bonds were quoted at a price approximate to their face value. But closely following on the heels of these results there came a severe depression of trade and industry which culminated in 1883 and 1884. The fall of the price of rice told most heavily upon farmers, who had contracted habits of luxury during the years of its high quotation, for practically their incomes now fell off by nearly one-half, while their burden in the shape of land-tax was doubled. Loud voices

of complaint against the government's financial policy resounded throughout the country, and the authorities had great difficulty in satisfying local officials, who sympathized with the farmers and came up to the metropolis one after another to lay their complaint before the Central government. Convinced that the redemption of paper money was of utmost importance to the state finance, the government was deaf against all complaints and resolutely pursued its policy.

Facts Connected with the Conversion of Paper Money.— By 1884 it was satisfactory to find that the amount of paper money in circulation was much reduced, while the government's reserve fund in specie considerably increased. In view of these facts, the price of paper money gradually kept rising until it stood on a par with silver. Now came the opportunity to carry out the convertible note system, and the government decided to permit the Bank of Japan to issue a certain amount of convertible bank notes as a sort of experiment, preparatory to the resumption of specie payments. The Convertible Bank Note Regulations were promulgated in May 1884, and the Bank of Japan issued convertible notes for the first time in May of the following year, the amount reaching 3,000,000 yen at the end of that year.

Every preparation for the resumption of specie paying having been made, the government began in January 1888 to pay specie for the government paper money, entrusting the business with the Bank of Japan.

Although the government commenced specie payment for the government paper money, the people rarely made the demand to have the exchange made. The reason was that the difference between paper and silver in value had already disappeared, and people generally preferred paper because of the convenience of handling.

As a result of the gradual redemption of both government paper money and National Bank notes, it was found on the last day of June 1888, that the amount of the former had been reduced by more than 49,000,000 yen and that of the latter by 28,000,000 yen. The opportunity arrived to finally dispose of them all and place the currency system of the country on a sound basis. The government therefore decided to permit the Bank of Japan to issue convertible notes to the amount of 70,000,000 yen on the security of a conversion reserve, of which sum 21,000,000 yen was to be issued by the Bank at its own will, 22,000,000 yen was to be supplied to the government as a loan at interest of 2 per cent for redemption of the government paper money, and the remaining 27,000,000 yen was to be issued by the Bank after January 1889, gradually in proportion as the National Bank notes would be redeemed. In view of this plan, the Convertible Bank Notes Regulations were amended in August 1889. The government, however, did not find it necessary to make the above-mentioned loan.

In March 1890, the government adopted a plan of setting apart as a redemption reserve the sum of 10,000,000 yen, out of the reserve fund, in order to accomplish the entire withdrawal of the government paper money. In May of the same year the legal amount of notes to be issued on the security of the Reserve by the Bank of Japan was enlarged to 85,000,000 yen, while at the same time it was provided that the Bank should loan the government 22,000,000 yen without interest. The Regulations were duly amended to suit these changes, and in July of the same year the government secured the above mentioned loan and added the amount to the Redemption Fund.

In these ways, both the government paper money and the National Bank notes were finally all withdrawn and the unification of the paper currency, by means of the Bank of Japan convertible notes, was accomplished. The amount of the government paper money which was redeemed from January 1886 to the end of March 1890 was more than 48,000,000 yen. Of this amount, 43,346,716 yen were exchanged with silver coins and 4,933,124 yen were redeemed by government bonds and other means.*

The amount of the bank notes which were redeemed in the same period was more than 3,700,000 yen. The following table gives the particulars:

	Yen
Amount redeemed by the Bank of Japan by means of the joint redemption method	3,730,451
Withdrawn from circulation on account of fraudulent alterations or winding up of business	33,561
Total	3,764,012

These schemes of redemption were carried out without a hitch, and in 1898 the law was promulgated announcing that the government paper money should cease to circulate after the 31 Dec. 1899.

With regard to the redemption of the national bank notes, it steadily progressed by means of the joint redemption method before mentioned, and in 1896 it was announced that they should also cease to circulate on 31 Dec. 1899.

To briefly sum up. In October 1881 there were in circulation more than 154,000,000 yen of inconvertible paper money. It was redeemed in the following ways: (1) The reserve paper money, 14,500,000 yen. This amount was entirely redeemed by the end of 1883 by means of the surplus funds obtained through effecting reform in the method of making receipts and disbursements of the public revenue and also by other means. (2) The government paper money, 105,905,212 yen. Of this amount, 65,839,956 yen were redeemed by the end of March 1890, 13,640,000 yen by the surplus revenue, 43,346,716 yen with specie and 8,853,240 yen by government bonds and other means. The remaining amount of 40,065,256 yen was gradually redeemed with 10,000,000 yen, the balance of the Reserve Fund, and 22,000,000 yen loaned from the Bank of Japan. The amount of 8,065,256 yen, which still remained unredeemed, was exchanged with silver coins of denominations below 50 sen out of the general revenue, as it consisted of paper money of smaller denominations. In these ways, the whole amount was adjusted within five years after 1899, at the end of which the circulation of the paper money ceased. (3) The national bank notes, 34,398,030 yen. Of this amount 3,764,013 yen were redeemed by the end of March 1890 by means of the joint redemption

* Of more than 43,000,000 yen, which were exchanged with silver and coins, the amount exchanged by demands from private people and banks was only some 8,900,000 yen. The rest of the paper money exchanged was received and exchanged with silver coins either by the Bank of Japan or by the government.

method and other means. The remaining amount of 32,634,017 yen was also redeemed by means of the joint redemption method within five years after 1899.

Thus all the inconvertible paper money in Japan was adjusted, and to-day only specie and the convertible notes issued by the Bank of Japan are in circulation.

The Effects of the Adjustment of Paper Money on the Finance of Japan.—As will be seen from the foregoing survey, prices fell to their normal standard and no fluctuations took place; the rate of interest became less than 10 per cent on an average after 1886; the government bonds were always quoted above their face-value; while the export trade of the country steadily increased, so much so that compared with that of 1886, 1889 showed an increase of 63 per cent and compared with that of 1885 an increase of 88 per cent. As for the banking and different industries they also became very prosperous. See BANKING SYSTEM.

The amount of capital invested in banks and different industrial and commercial companies increased two and a half fold in five years. If banks are excluded, the increase was four fold. The businesses that made especially striding progress during this period were railroads and spinning mills. Other industries also showed a tendency of steady advance, and on the whole the business situation presented a very favorable prospect.

The adjustment or withdrawal of non-convertible paper money was accomplished in such circumstances. But whatever may be said nominally, the task was effected on the basis of silver conversion and the country, henceforth, became one of *de facto* silver standard.

The necessity had been foreseen of the country adopting sooner or later the gold standard system, in order that it might keep pace with the world's tendency and that it might enter the international circle of common economics. But the step could not be immediately taken at the time as silver was still the principal currency in the neighboring countries, while bimetalism had not yet lost its influence with not a few countries of Europe and America. Besides the adoption of the gold standard required a large gold reserve, which in the prevailing circumstances was difficult to obtain. For this reason, the country was obliged temporarily to adopt in practice a silver standard thereby to accomplish the withdrawal of paper money by exchanging it for silver.

In looking back to the price of silver in modern times, it is seen that the ratio between gold and silver prior to 1873 was fairly stable at about 1 to 15.5. From about 1871 the world's production of silver greatly increased, this being almost synchronous with the advent of the new German Empire. That country, in its endeavors to reform and unify its system of currency, saw the advisability of replacing silver with gold, and stopped its free coinage of silver by enacting a new currency law. In 1873 Germany finally put the gold standard system in force and began to dispose of large quantities of silver. This gave rise to a powerful tendency for the depreciation of silver. In consequence, many countries of Europe and America, which had hitherto had in force a bimetallic standard, began to feel the danger of being forced to a position of practically using the silver standard system. A change of the currency system to a gold standard then became infectious among these countries, some of them adopting it immediately, others ceasing the free coining of silver, all running to the policy of absorbing gold to the rejection of silver. The pro-gold-anti-silver policy of these countries resulted naturally in more and more pushing down the price of silver, so that in 1876 the ratio between gold and silver came to stand at 1 to 17.88, an average for that year. This aroused the countries producing or possessing large quantities of silver to an effort to uphold the price of that metal. In 1878 the United States enacted the Bland Law and tried to stem the downward tendency of silver by buying and coining it. The republic went further in 1890 and replaced the Bland Law with the Sherman Law, which gave the government the power to buy up a larger quantity of silver. For a time this had the effect of slackening the fall of silver, even of recovering its price to some extent. But the great force of tide was not to be resisted by artificial means, and in 1891 the ratio fell on an average to 1 to 20.9, which still further went down to 1 to 23.72 in 1893, with a threatening prospect that there would be no end to the depreciation of silver. It had, then, become clear that there was no longer any hope for the future of silver and the countries which had been looking on began to act, some of them stopping the free coinage of silver, and others adopting gold standard. In 1893 the United States repealed the Sherman Law, and also British India, which had hitherto been a great silver using country stopped the free coinage of the metal, the latter going so far as to charge a duty of 5 per cent on its importation the following year. Its downward career continuing, silver came to stand in 1894 on an average at the ratio of 32.56 against 1 of gold.

Not many years after the adjustment of paper money in this country, thus, the fall of silver became so marked that its currency system, which for the time had obtained a stability by the reform on silver basis, came to be seriously affected. At that time two-thirds of the country's foreign trade were with the gold countries, and the ratio of exchange with them became so fluctuating that those engaged in the trade knew not how to conduct their business, while the persistent rise of prices of commodities tended to engender a speculative spirit among the people. It became apparent that the maintenance of the silver standard system was not to the good of the country.

Such being the case, the then Minister of Finance, Mr. Kunitake Watanobe (since created viscount), recommended to the government the appointment of a commission composed of men experienced and learned in economic matters, to investigate and deliberate carefully on a policy that might be adopted as to the future of the country's currency system. As the result, an Imperial Ordinance was issued in October 1893, appointing a Coinage Investigation Commission, which, after spending nearly three years on its work, submitted a report in July 1896. Of the commission of 15, eight were of opinion that there was a necessity of making changes in the coinage system, while the remaining seven thought otherwise. Of the

majority, six were in favor of a gold standard, and two advocated a bimetallic system. Previous to this, in March 1895 Matsukata had returned to the post of Minister of Finance. In the following month a peace treaty was concluded with China, and that country agreed to pay a war indemnity amounting to 200,000,000 taels. As already stated he had foreseen the necessity of the country adopting the gold standard system in order to keep pace with the world's tendency. But owing to the difficulty of acquiring an adequate supply of gold for the purpose, Matsukata could not help hesitating forthwith to take up the reform. Now that, however, a large war indemnity was to come from China, the best opportunity was presenting itself for the execution of the reform. In order to pay the indemnity, China could do so only by raising a loan in the European markets. In the peace treaty the indemnity was stated in the terms of *Kuping tael*. But since money was to come from the European markets, it was plain that it would involve China in no small trouble to reduce it first into silver and then pay it to this country, while it would be very convenient to her if it could be so arranged that she pay it in the currency she raised in London and other markets. Such an arrangement would be equally acceptable to this country, which might keep the money paid as a gold reserve for the purpose of adopting the gold standard system. The suggestion along this line met with the approval of the Imperial government, which, thereupon, approached the Chinese government with the proposition indicated. China's answer being favorable, negotiations were concluded in the sense that the weight of one Kuping tael would be fixed at 575.82 grains of pure silver, and China would pay the entire amount of indemnity reduced into the terms of British currency at the ratio of 30.4429202662d. for one ounce of silver of the standard quality in London, being the average of the prices for June, July and August of 1895. A protocol to this effect was exchanged between the two countries on 6 Oct. 1895.

Subsequently the two governments agreed to compute in British money the amount to be paid by China as compensation for the retrocession of the Liaotung Peninsula, namely, 30,000,000 Kuping taels, as well as the indemnity for the expenses of occupying Wei-hai-wei, namely 500,000 Kuping taels yearly. Thus the amount due from China as indemnity and otherwise totaled £38,082,884 15s. 6½d., or 231,500,000 Kuping taels.

Matsukata resigned in August 1895, his views on the post-bellum financing failing to receive the approval of the government. But in September of the following year, he formed a new Cabinet by Imperial order, holding at the same time the post of Finance Minister. This gave him an opportunity, at once, to proceed with preliminaries for the adoption of gold standard. He submitted a draft of the Coinage Law with its subsidiary laws to the Cabinet Council on 25 Feb. 1897, and obtained its approval. It was then that the late Emperor granted him the gracious words to the effect that opinions were divided as to the advisability of adopting a gold standard, but coming from Matsukata, it should be depended that his views were correct. He was profoundly impressed with the honor done and vowed to himself at the time that, happen what may, he must bring the scheme to a success.

The bills for the Coinage Law and subsidiary laws, were introduced in the House of Representatives on 1 March 1897. The Coinage Law Bill was drafted on the basis of pure gold standard, laying it down that the weight of two *fün* (gram 0.75) of pure gold shall be the unit of the coinage and shall be called *yen*. As to the one-yen silver coin in circulation, it was proposed to withdraw it gradually by exchanging, according to the convenience of the government, and that a six months' notice would be given in the form of an Imperial Ordinance, in case its circulation was to be stopped, while it would remain convertible for five years from the day after the promulgation of such ordinance. The reason why the weight of unit yen was fixed at 2 *fün* of pure gold was because of the following circumstances. The silver yen in circulation contained 6 *momme* 4 *fün* and fractions of pure silver, and thus the new gold coin would bring the ratio of gold and silver to 1 to 32 and fractions, which was comparatively a near approach to the average ratio at London since January of that year, which was 1 to 32 (slightly less), and which would, therefore, facilitate the settlement of transactions in the transition from the silver to the gold standard system. Further the old gold yen would correspond exactly to two new gold yen. These were the points in favor of the proposal, in keeping the old and new coins in circulation. Nevertheless objections raised to the Coinage Bill were not few. One of them was that the adoption of gold standard would prove a check to the growing export trade of the country with gold countries, for the fall of silver proved an encouragement to trade, which it would be as long as silver remained the standard. Another was that, as all the Oriental countries were using silver, the adoption of gold standard would greatly interfere with this country's trade with them. The third was that the country would not be able to maintain a gold standard as it produced very little gold; the fourth that more than 100,000,000 yen of the country's silver yen had found its way abroad, and the national treasury would have to incur staggering losses, should it be sent back here for conversion on the further fall of silver. Nor did these exhaust by any means the faults found with the proposed reform. But if the country was to achieve a healthy economic development, it was imperative that it push its way to join the international circle of common economics. To do so the economic basis of the country must be put on a system of coinage in common use throughout the world. By the end of 1896 the country had already received something over £22,400,000 in part settlement of dues from China, and could not afford to let pass the excellent opportunity to carry out the currency reform by the use of the money. It was no time to be overweighed by doubts. Fortunately the Diet shared the views of the government, and both the Representatives and Peers passed the coinage and other subsidiary bills with not a single amendment. The Imperial sanction was obtained on 29 March and the bills became laws to take effect from 1 October.

In putting the new Coinage Law into opera-

tion Matsukata took pains to think out plans to insure its success. They were: (1) To buy gold bullion with the proceeds of Chinese indemnity, to bring home to be struck into new gold coin; and (2) to effect the exchange and withdrawal from circulation of one-yen silver and the one-yen silver certificates issued by the Mint, with part of the new gold coin thus minted. As the result of careful investigations a fairly accurate estimate was obtained as to the amounts to be exchanged, namely, silver yen in circulation at home 39,320,000 yen, that to be sent back from abroad 10,000,000 yen, and silver bullion corresponding to the silver certificates of the Mint 30,000,000 yen, a total of 79,320,000 yen; (3) to dispose of one-yen silver retired from circulation and the redeemed silver bullion, partly by minting them into subsidiary coin, and partly by seling them abroad, after disfiguring it in the case of one-yen silver, so as to make it legally unfit for circulation at home; (4) to make an increased issue of subsidiary silver coins. The gold piece which would correspond to one yen, if coined, would be so tiny and light as to make it inconvenient for daily transactions. For this reason no provision was made in the Coinage Law for the minting of one-yen gold piece. Yet in order to keep firm the foundations of the currency system, and to protect the masses from losses, the people must be supplied with hard money for purposes of small daily transactions. The one-yen convertible notes, then in circulation to the amount of over 60,000,000 yen were filling this need. It was proposed, therefore, to issue subsidiary coins of 50 sen and smaller denominations to the amount of 40,000,000 yen to take the place of one-yen convertible notes, which were to be retired.

In pursuance of the plan summarized above, Matsukata set about carrying into effect of the gold standard system. Between January 1898 and November of the same year, he was out of office; but the execution of the plans was continued during the interval. On his return to office, again as the Minister of Finance, he finally carried them to completion.

In putting the Coinage Law into operation, the first step taken was to cause the Mint incessantly to strike off the new gold coin out of the gold bullion bought with part of proceeds of the Chinese indemnity, which was brought home as rapidly as it was secured. The minting of the new coin was started in July 1897, when the bullion began to arrive, and by April 1898, 74,455,735 yen worth was turned out. Prepared with this new gold coin the exchange of old silver yen was commenced on 1 Oct. 1897, the day on which the Coinage Law went into force.

Previous to this Matsukata had concluded that it was of advantage to the progress of the currency reform to stop the circulation of one-yen silver as early as possible. Consequently on 18 Sept. 1897, the Imperial sanction was obtained for an Ordinance, which was forthwith proclaimed, limiting the period of its circulation to the first day of April 1898. According to the new Coinage Law, a term of five years was allowed for the exchange of one-yen silver, after it ceased to circulate. What turned out was, however, that the work had progressed with unexpected rapidity, so much so that there was no need to let the five year term run its course. In fact, there was not only no need of it, but some danger that, if the five year period was allowed to remain, counterfeit one-yen pieces might be imported from abroad. On account of this, toward the end of 1897 he submitted to the Cabinet a draft of law for shortening the period in question; but owing to the dissolution of the Imperial Diet, which then took place, the bill was never laid before the legislature. Marquis Inouye, who succeeded Matsukata in the office of the Minister of Finance, also saw the need of cutting short the five year period, and a bill of that import was introduced in June 1898, in the Diet, which was then sitting in an extraordinary session, and was passed by the two Houses. The bill became law with the Imperial sanction and was promulgated on the 10th of the same month, announcing that the exchange period shall close on 31 July 1898. Thus was finished the task of exchanging one-yen silver.

On looking back to the circumstances which attended the exchange operations, it must be noted, first of all, that there had been a total issue of 165,133,710 yen in one-year silver. Of this amount, a net total remaining abroad (or the residue obtained by deducting that which having once gone abroad found its way back into the country by 31 July 1898, the day on which expired the period allowed for the exchange of one-yen silver) was 99,508,740 yen. Again, the sum of 11,028,633 yen was taken and disbursed abroad during the war with China, while that which remained unexchanged by 31 July 1898, out of the amount sent to Formosa after the island had become Japan's possession, was 5,732,027 yen. On the other hand the amount exchanged for gold coin, or retired on being received in payment of taxes and other dues between 1 Oct. 1897 and 31 July 1898 was 45,588,369 yen (including 10,846,465 yen that came back from abroad, and 34,741,904 yen in circulation at home). Besides this the amount recoined by the government was 460,904 yen. The total thus accounted for stood at 162,318,673 yen which as compared with the total sum which had been issued, showed a difference of 2,815,037 yen, — the amount which was not exchanged within the period set apart for exchange, and which was probably lost or destroyed at home or taken away by foreign travelers. The return of one-yen silver had been looked upon as the greatest difficulty in the way of putting the gold standard system into execution, and the matter had received my most careful attention, which included receiving reports from Shanghai, Hongkong and the strait settlements and other places, concerning its movements. It was discovered that in China a large quantity of it had been recast into the tael silver, while many others of it circulating there had been disfigured and had lost their qualifications as Japanese legal tender. It was ascertained further that it was also largely in circulation scattered in the strait settlements and the neighboring islands, under conditions which made its return home difficult. In the light of these facts, it was finally decided to put the estimate of the one-yen silver returning home for exchange at about 10,000,000 yen, as stated above. It was a piece of good fortune that the actual results of exchange proved the estimate fairly correct. The amount of silver certificates issued by the Mint, which

remained unredeemed, stood at 29,505,453 yen at the time when the new Coinage Law came into force. These were also all exchanged. Thus the amount of one-yen silver that was exchanged for gold coin, or withdrawn through being received in payment of taxes or other dues, between 1 Oct. 1897 and 31 July 1898 totaled 45,588,369 yen, and that exchanged for silver bullion held against the silver certificates 29,505,453 yen as already mentioned, making a grand total of 75,093,822 yen, coming quite close to the estimate. Although the period set down for the exchange of one-yen silver was shortened to ten months, as stated above, elaborate care was taken in carrying out the operation, which was conducted at the Central Government Treasury, 447 local treasuries and subtreasuries throughout the country, and the Bank of Japan's agent, the Yokohama Specie Bank and its branch at Kobe. Also one-yen silver was accepted in payment of taxes and other dues during the period. Every facility was thus extended for the purpose, and the exchange operation was completed with perfect smoothness, so that not a single case of omission was reported at its termination.

A sum of 27,567,012 yen out of 75,093,822 yen, which represented the total of one-yen silver withdrawn and silver bullion released from the silver certificates, was turned over to the service of subsidiary silver coins to be minted in the 1897, 1898 and 1899 fiscal years, while 40,786,662 yen was disposed of at Shanghai and Hongkong, and the remaining 6,740,148 yen was transported to Formosa and Korea, to be there released for circulation. This part of the business was in this way completed in December 1898, or one year and three months after the coming into force of the new Coinage Law. The greatest care was exercised in this operation of disposing of the retired silver coin and bullion, to carry it out as speedily as possible at as high prices as obtainable. There was, at first, a fear that a loss of 10 per cent or more might be sustained owing to the fall of silver; but fortunately the actual shrinkage incurred was only seven per cent, while the operation was finished in a little over one year. More satisfactory still, the price at which the sale was effected was somewhat higher than the average silver quotation in London at the time. The total charged to the National Treasury on account of the retiring of the silver currency was 5,553,312 yen, including 5,397,581 yen representing the shrinkage, and 155,731 yen the amount of general expenditure for conducting the operation. This disbursement was met with the profit of the Mint accruing from making the subsidiary coins which amounted to 5,651,961 yen, and which, therefore, yielded some surplus. So was completed the work of putting into execution the gold standard system.

Between 22 and 23 years have elapsed since the adoption of gold standard. Within that time the country came through great wars extending over a year, but the foundation of its currency system has suffered in no way. In looking over the economic condition of the country during that span of time, it is seen that nothing has happened to prove much against the calculations made in anticipation. The range of fluctuations in the prices of commodities in general has become considerably narrower than formerly, enabling merchants and manufacturers to form their plans on a firm and stable basis. The rate of exchange with the gold countries has been freed from violent fluctuations, so that the country's trade with them has been given opportunities to grow steadily under very healthy conditions. The economic world of the country is now on a rising career. It may be noted that what is gained in transactions with the gold countries is liable to be lost in those with the silver countries. But this country's relations with the silver countries have never been so great as those with the gold countries. Besides the fluctuations of silver were not so great as before the adoption of gold standard, and the results of trade with the silver countries show that it has not suffered seriously. On the contrary it is growing steadily. Especially worthy of notice is the fact that the adoption of gold standard has induced the people of the rich countries of Europe and America to invest in this country their money carrying a low interest, with a feeling of perfect security. That this circumstance has to no small extent been helpful to the industrial development of this country admits no manner of doubt. Furthermore it must not be forgotten that the fact of this being a gold country gave it great advantages when, at the time of the 1904–05 war, it raised large loans in the western markets.

Those who desire to have fuller particulars of the subjects treated in the present article, will find them in the 'Report on the Adoption of Gold Standard in Japan,' published in 1899.

COUNT MASAYOSHI MATSUKATA.

17. BANKING SYSTEM OF JAPAN.

The progress of the banking system in Japan commenced at the enactment of the National Bank Regulations in 1872. The progress was rapid, and at present (1918), 46 years after the enactment, Japan possesses a complete system of ordinary and savings banks; special banks to minister to the development of foreign exchange, agriculture, commerce and industry; clearing houses and the different associations, information bureaus, brokerage houses, trust companies, etc., to assist the work of the banks.

Even before the Restoration in 1868 there had been in Japan institutions conducting the works of banks. They received deposits, made loans, issued exchange and commercial bills, and conducting exchequer business for feudal lords and shoguns, thus promoting the economic progress of the country. After the Restoration, establishments called exchange companies were organized, at the instance of the government, at several commercial centres. They also conducted a general banking business and issued gold and silver notes. The constitution of these establishments was, however, not perfect enough to entitle them to the name of banks according to the modern understanding. The banking corporation worthy of the name did not exist in Japan until the national banks were established.

After the Restoration in 1868 the government sent a deputation to inspect the banking system of foreign countries for the purpose not only of promoting the financial and industrial prosperity of Japan, but of consolidating the government paper money, which had been issued to an enormous amount. As the result of this inspection tour the government promulgated, in November

1872, the National Bank Regulations, drawn up after the model of the American system. According to the regulations the national banks had to pay six-tenths of their capital to the government in the government paper money; to receive in exchange the same amount of public loan bonds; to deposit the bonds with the government and get permission to issue the same amount of bank notes convertible to gold. The First and three other national banks were established in accordance with the regulations. At the time, however, the government had to issue inconvertible notes to meet national expenditure, and the result was that there was a difference in value between paper and hard money. Bank notes issued by the banks were returned to the banks instantly, placing them in serious difficulties. About this time the government gave public loan bonds to the nobility and Samurai class to compensate for the loss of their income. In order to increase the utility of these bonds on the one hand and to relieve the banks of their difficulties on the other, the government encouraged the organization of new banks, and in 1876 made an amendment to the National Bank Regulations. According to the new regulations the amount of notes to be issued by the banks was increased to eight-tenths of their capital. The banks had to deposit the same amount of public loan bonds with the government as security for their bank notes, which were made convertible with coin. As the result of this amendment the bank notes heretofore convertible to gold became inconvertible, and the banks were able to get more profits than before. This gave an impetus to the organization of banks, the number of which reached 153 at one time.

Moreover, the government issued a large amount of paper notes in order to meet the expenses relating to the Satsuma Rebellion of 1877, with the result that the amount of inconvertible bank notes greatly increased and their value decreased as compared with hard money.

In order to improve the situation, the government, after 1877, endeavored to discourage the organization of national banks and to decrease the amount of notes. In 1880 it had the Yokohama Specie Bank established as an organ of foreign exchange and of promoting the importation of specie. In 1882 the Bank of Japan was established after the style of the Central Banks in European states. In the next year the National Bank Regulations were again amended, prohibiting the existence of national banks on the expiration of their respective terms of business. The privilege to issue notes was taken back from those banks and given to the Bank of Japan. By this amendment the principle of the unification of paper currency was established, and the national banks, hitherto exercising great influence in the money market, were, one by one, converted into private banks, and in 1899 the national banks had ceased to exist.

The progress of private banks was steady after the Restoration, and their number reached 954 in 1884. At the time, however, the national banks still exercised great power in the money market, and as there was little necessity for the central government to exercise strict supervision over other banks, the latter were relegated to the control of local governments. Subsequently, the national banks were converted into private banks, due to the amendment of the National Bank Regulations, as already mentioned, and independent of this there was a tendency for the steady increase of the number of private banks. To cope with the situation the government, in 1890, promulgated the Banking Regulations and the Savings Bank Regulations. These laws were not put in force till 1893, to which date the operation of the Commericial Code was postponed.

These laws constituted almost a perfect system of legislation relating to banks, except with regard to the function of making loans of a long term for agriculture and industry. In order to make good this defect the government, in 1896, issue the Law of the Hypothec Bank of Japan and Law of the Agricultural and Industrial Banks. The former bank was then established in Tokio and the latter in Tokio and in each of the other prefectures.

In 1895 Japan came into possession of Formosa, and in order to improve the monetary conditions in that island the government, in 1897, promulgated the Law of the Bank of Formosa. The bank was established in 1899 and conducted the issue of convertible notes and general banking business.

As there was no financial organ for the colonization of Hokkaido, the government enacted in 1899 the Laws of the Colonial Bank of Hokkaido, and the bank was established in the following year.

Meanwhile the number of various industrial companies in Japan kept increasing, and the amount of shares and debenture issued by these companies reached huge figures. In spite of this fact, Japan had few banks which could make sufficient loans on these shares and debentures. This circumstance being considered detrimental to the progress of the nation's industry, the government, in 1900, promulgated the Law of the Industrial Bank of Japan, and a bank on the basis of this law was established in 1902.

In view of the increasing number of Japanese banks carrying on their business in foreign countries, the government, in 1905, promulgated a law for the control of such banks, providing that imperial ordinances may be issued for the said control according to the conditions prevailing in the country where the banks are engaged in business. In the same year an imperial ordinance was issued in relation to the Dai-ichi Ginko, Ltd., carrying on its business in Korea. By the ordinance the bank was authorized to issue bank notes in Korea. In 1909 the Bank of Korea (later renamed Bank of Chosen) was established and succeeded to the business of the Dai-ichi Ginko, Ltd., and became the central bank in Chosen.

The Yokohama Specie Bank obtained the right to issue bank notes in foreign countries in 1901, and has been exercising that right in China. In 1906 an imperial ordinance was issued to control the issue of business of the Yokohama Specie Bank.

Special Banks — 1. The Bank of Japan.— The Bank of Japan is the central bank of the empire, established in accordance with the Law of the Bank of Japan. At the end of 1915 it had a registered capital amounting to $30,000,000, of which $18,750,000 had been paid up,

and possessed reserves amounting to $15,112,500. Its business consists of discounting or purchasing public loan bonds and commercial bills, purchase and sale of gold and silver bullion, making loans on security of gold or silver or of bonds guaranteed by the government, collection of bills, receiving deposits for safety and making cash accounts for the state treasury.

The bank has the privilege to issue bank notes convertible to gold coins. In principle the bank has to keep the same amount of gold and silver as conversion fund. But at the same time it is allowed to substitute the specie reserve with sound bonds to the extent of $60,000,000. In the event of the money market demanding a large amount of currency, the bank, subject to permission by the government, may issue notes in excess over the legal limit. The excess issue must be, of course, backed by security reserves. In this case, a tax of not less than 5 per cent per annum is imposed on the amount issued over the legal limit. At the end of 1915 the amount of convertible notes issued stood at $215,069,005, of which the sum of $124,208,900 was backed by specie reserve.

The government exercises the most strict supervision over the bank, being represented by standing inspectors. The governor and vice-governor of the bank are appointed by the government, and the bank cannot change its regulations (company contract) and take important measures without permission or sanction of the Minister of Finance.

2. The Yokohama Specie Bank.— The Yokohama Specie Bank was established in accordance with the Law of the Yokohama Specie Bank, and its principal object is to conduct foreign exchange business. At the end of 1915 it had a registered capital amounting to $24,000,000, of which $15,000,000 had been paid up, and reserves amounting to $10,675,086. It has branch offices not only in many places in Japan and Kwantung Province, Manchuria, but in London, Lyons, New York, San Francisco, Hawaii, Bombay, Calcutta, Hongkong and various points in China. The offices in Kwantung Province and China are allowed by the government to issue notes convertible to silver, against the reserves of the same amount. The kind of the reserves are ordered by the government. At present the bank is ordered to keep specie reserves against more than half of the issue amount, and security reserves for the remainder. The government supervision over the bank is exercised by permanent inspectors, and the appointment of directors, elected at a general meeting of shareholders, is valid only after being sanctioned by the Minister of Finance. On the whole, the bank is supervised by the government in the same manner as is the Bank of Japan.

3. The Hypothec Bank of Japan.— The object of this bank is to promote the improvement and progress of agriculture and industry, and it mostly makes loans on immovable property. At the end of 1915 it had a registered capital of $20,000,000, fully paid up, and reserves amounting to $2,769,200. In business it makes loans to be repaid in annual instalments covering not more than 50 years, usually on security of immovable property. It may also make fixed loans on immovable property for a term of not more than five years. Such loans, however, shall not exceed one-tenth of the total amount of loans made for yearly instalments. The bank may also make loans without security to public or other sound corporations.

As a means to obtain funds the bank is allowed to issue debentures up to an amount 10 times as large as the sum of its fixed deposits and paid-up capital. As a means of advancing money to the Agricultural and Industrial banks, it may take up debentures issued by those banks, make loans on security of right of claim of those banks due to their loans and appoint those banks to be its agents and make loans on their standing as security. The government supervises this bank generally in the same manner as it supervises the Bank of Japan.

4. The Agricultural and Industrial Bank.— This bank has been established in each prefecture, in accordance with the Law of the Agricultural and Industrial Banks. It has the same object of business as the Hypothec Bank of Japan, only on a smaller scale. At the end of 1915 the number of the Agricultural and Industrial banks in Japan was 46, having a total registered capital of $25,360,000 ($22,547,500 paid up), and reserves amounting to $13,532,279. Its line of business is, on the whole, the same as that of the Hypothec Bank of Japan. But they are different in that the Agricultural and Industrial Bank is allowed to make loans repayable in yearly instalments extending over only 30 years, and that the maximum of debentures to be issued is only five times its paid-up capital. The government supervision over the bank is similar to that over the Hypothec Bank, except that in this bank the appointment of directors is solely entrusted to election by a general meeting of shareholders.

5. The Bank of Formosa.— This is a colonial bank especially organized for the exploitation of Formosa. At the end of 1915 it had a registered capital amounting to $4,000,000 ($6,250,000 paid up), and reserves amounting to $2,075,000. It engages in a general banking business and owns the privilege to issue bank notes convertible into gold coin. The issue is conducted in a manner generally similar to that of the Bank of Japan. The method and degree of the government supervision over this bank is on the whole similar to that over the Bank of Japan.

6. The Hokkaido Colonial Bank.— The object of this bank is to supply funds for the work of colonization of Hokkaido. At the end of 1915 it had a capital amounting to $2,500,000 fully paid up, and reserves amounting to $780,850. Its business consists essentially of making loans for long terms on security of immovable property. It is also allowed to make loans on security of local produce and of shares and debentures, discount bills, take up debentures of the companies whose object is to colonize the island, engage in exchange business and receive deposits fixed or on current account. The bank may issue debentures to the extent of five times its paid-up capital. The government supervision is conducted in a similar manner to that over the Agricultural and Industrial banks.

7. The Industrial Bank of Japan.— This bank can be aptly called a bank of movable property. At the end of 1915 it had a registered capital amounting to $8,750,000 ($8,500,000 paid up), and reserves amounting to $962,500. Its business consists in subscribing or taking up public and local loan bond and de-

bentures, making loans on security of these bonds or shares, or of corporations established in accordance with laws relating to mines, factories and railways, in receiving deposits, safekeeping and trust business relating to mortgage debentures, etc. The bank can issue debentures aggregating not more than 10 times its paid-up capital. The method and extent of the government supervision over this bank are similar to that over the Hypothec Bank of Japan.

8. The Bank of Chosen.— This bank was established in 1909 and was first called the Bank of Korea, but renamed the Bank of Chosen in 1911, and has its head office in Keijo (Seoul). At the end of 1915 it had a registered capital amounting to $2,000,000 (fully paid up), and reserves amounting to $189,250. It engages in a general banking business and owns the privilege of issuing bank notes convertible into gold coin or the Bank of Japan convertible notes. The issue of the notes, backed by security reserves, is limited to $15,000,000. According to requirements of the money market, the bank may, subject to permission by the governor-general of Chosen, issue notes in excess over this limit. At the end of 1915 the amount of convertible notes issued stood at $17,193,760. The bank has its branch offices in Tokio, Mukden, Dairen, Cheng-chun, Ssu-ping-chieh, Kaiyuan, Harping and Ying-kou.

Ordinary Banks.— By ordinary banks is meant those banks which engage in a general banking business in accordance with the Banking Regulation. Of all banks, these are under the most lenient supervision by the government.

Those who desire to engage in ordinary banking business must obtain the sanction of the Minister of Finance. The amount of the capital of an ordinary bank was formerly without any limitation, but since 1901 all banks have been ordered to possess a capital amounting to $250,000 at least. The classification, number and amount of capital of ordinary banks existing in Japan at the end of 1915 were as follows:

Kinds of Banks	Number	Registered capital
Kabushiki Kaisha	1,228	$242,259,205 00
Gomei Kaisha	67	7,626,475 00
Goshi Kaisha	99	5,752,717 50
Kabushiki Goshi Kaisha	1	100,000 00
Individuals	54	1,895,760 00
Total	1,449	$257,634,857 50

According to investigations made at the end of 1915, paid-up capital totalled $179,255,992 and reserves $63,849,702.50.

Savings Banks.— The savings banks receive deposits at the rate of compound interest, and are subject to government supervision more strict than given to ordinary banks, in the following points: (1) They must be organized as joint-stock companies, limited. (2) They must not amend their company contract without the sanction of the government. (3) Directors must be under unlimited liabilities. (4) They must reserve one-fourth of savings deposits in the shape of public loan bonds or other sound securities and deposit them with the government as security for depositors. At first there were restrictions with regard to the sort of investment to be made by the savings banks. But these restrictions were removed in 1895, and instead the four provisions above enumerated were instituted. As a result of the measure the savings banks now invest their money in a similar way as ordinary banks. The number and amount of registered capital of savings banks at the end of 1915 were 657 and $96,662,175, respectively. According to investigation under the same date the paid-up capital aggregated $60,463,596 and the reserves $11,216,104.

The government postal savings banks recorded in April 1917 total deposits amounting to $159,580,639.

Clearing-houses.— The clearing-house in Japan was first established in Osaka in 1879 after the model of similar institutions in Europe and America. Subsequently it was organized in Tokio and other places, there being at present 11 clearing houses in Japan. The one in Tokio has the following regulations, and those in other places have on the whole similar regulations: (1) Members are limited to those banks which are members of the Tokio Bankers' Association and which have current account connections with the Bank of Japan. (2) New membership shall be awarded with approval of more than three-fourths of the total number of members, to be decided by open ballot. (3) Members shall deposit security money with the house, and in the event of their failing to repay their debts in the clearance of bills, the account will be settled with the security money. In that case the defaulter loses his membership. (4) Members may represent non-member banks in clearing bills, provided that a majority of the members approve of the representation. (5) In the case of the above clause, the representing bank shall demand a money security from the represented bank, and use that money for settling accounts in case the latter fails to repay debts due to clearing its bills. In that case the clearing house shall refuse to entertain the representation of that particular bank. (6) In the event of the payer of bills cleared failing to pay, the name of that payer shall be made public. (7) The clearing-house accounts of members are settled by current account at the Bank of Japan. Number and value of bills cleared at different clearing houses in Japan in 1915 were as follows:

Clearing Houses	Number of bills	Valuation
Tokio	4,657,708	$2,593,705,529 50
Osaka	3,314,561	1,699,438,390 00
Kioto	780,259	154,461,509 00
Yokohama	626,082	587,909,176 00
Kobe	804,538	538,752,244 50
Nagoya	470,273	143,105,156 50
Hiroshima	89,457	15,940,694 50
Kan-Mon	120,072	57,603,825 00
Kanazawa	81,730	15,502,767 00
Hakodate	134,231	25,564,300 50
Otaru	112,654	30,476,500 50
Total	11,191,565	$5,812,860,093 00

Baron Yoshiro Sakatani.

18. AGRICULTURE IN JAPAN. History.— The ancestors of the modern Japanese seem not to have been eaters of meat and milk, and butter and cheese were unknown to them. These facts, together with the mountainous character of the country, fully justify the supposition of the non-existence of any nomadic tribe. It is very probable that from the earliest time the Japanese understood how to till the soil, whose only crop, however, with the possi-

ble exception of hemp, was rice. European authors seem to think that the Japanese started agriculture after the Chinese pattern, but there is reason to believe that the cultivation of rice was introduced from India. Rice in those days was probably sown in marshy places, year after year in succession, without fallowing and without manure. But it was soon found that marshes were not sufficient. As the agricultural lands gradually extended, the first great effort of the government to foster agriculture was in making arrangements for irrigation. When we consider that low tracts of land only were devoted to rice culture, where rain water and irrigation were productive of large quantities of rich soil, we can understand why successive crops of rice have not exhausted the soil's fertility. Moreover, as nitrification does not occur in wet soils, nitrogenous compounds were little wasted.

Breaking up land for rice was much encouraged, which led to the proprietorship of land at a very early period. But lack of knowledge and capital only permitted the irrigation of low tracts of land, and the resources of paddy fields were soon exhausted. Then it became necessary to till the dry fields and the cultivation of barley was gradually introduced, but we cannot say the exact date. Indian millets, soybean and other crops were also introduced and their cultivation encouraged. Indeed we find in very early literature the name of "gokoku" (the five grains), which signified rice, barley, soybean, awa and hiye, the latter two being kinds of Indian millets, or sometimes rice, barley, awa, soybean and adzuki (Phaseolus radiatus).

It is very probable that silkworm raising began at a much earlier date than is generally believed, but the silk industry was not greatly encouraged until after the eggs of Chinese silkworms were introduced in 195 A.D. Thereafter silkworm raising continued to occupy an important place in farming, until it fell into decline on account of the civil wars, its revival taking place only after the mikado was restored to power in 1871.

Whether or not any live stock, such as cattle and horses, existed in the remotest antiquity is much disputed, but if so they were certainly not much used. At first even cattle were used solely as beasts of burden, for which purpose, on account of the mountainous character of the country, and the narrow and rugged roads, they were better suited than horses. They were often slaughtered, not for meat, but for their hide. The use of milk as food was unknown. It was in the reign of Kotoku (645–654) when the use of milk as medicine was introduced, but such use was discouraged by Buddhism. Horses came into use very early for the saddle and as beasts of burden; indeed the north-eastern provinces were celebrated for their horse breeding.

The use of live stock as meat came gradually into use and even swine were raised to some extent. But after Buddhism came into power the government prohibited the slaughtering of live stock, so the raising of swine was stopped entirely. Cattle were then used solely as beasts of burden and for cultivation, for which purpose small farmers often preferred them to horses, especially in mountainous districts.

It is evident, therefore, that Japanese agriculture must have been the tilling husbandry from the very beginning and remains so to the present day, except in mountainous districts where large tracts of natural pasture are found, on which cattle and horse-breeding is conducted by farmers. The Japanese greatly esteemed agriculture and believed in the Chinese saying, translated into Japanese, "No wa Kuni no moto," which means "agriculture is the foundation of the country," and every sagacious emperor and his advisers encouraged the improvement of agriculture, mainly after the Chinese pattern. But before the establishment of feudalism, when the nobles became very powerful, its encouragement was largely neglected and the land gradually fell into the possession of a few, and heavy rent was levied by landlords. From that time also, on account of the disturbance of internal peace, farmers suffered and agriculture greatly declined. Notwithstanding these discouragements various circumstances helped the farmers to improve their agriculture, and new crops and improved implements were gradually introduced, and in some districts agriculture made noteworthy progress. But universal progress began only after the restoration of peace by Taiko Hideyoshi. During the eras Keicho and Genna (1596–1623) many important crops were introduced, among which may be mentioned cotton (which indeed had been introduced once before), tobacco, potatoes, sweet potatoes, sugar cane, etc. Under the long peaceful Shogunate of Tokugawa, agriculture flourished and made great progress. As the country became closed to foreign intercourse, the people were more and more dependent upon agriculture to supply their needs, and Tokugawa Shogun and many feudal lords greatly encouraged it on their estates, though there were other lords who cared very little for their people, and there, under heavy tax, agriculture could not make much progress. Thus even at present great differences can be seen in the state of agriculture in various localities. After the restoration to power of the mikado, and the beginning of the Meiji era, there was rapid and great progress, which will be treated under another heading.

Area of the Land under Cultivation and Crops Cultivated.—Though agriculture is conducted very intensively, and especially in the warmer part of the country, terracing is employed on an extended scale* on account of the predominant mountainous character of the country and on account of the method of farming which is based principally on rice cultivation. Mixed farming is almost entirely unknown except in the mountainous districts, and the percentage of the land under cultivation is therefore very small. Indeed with the exception of Hokkaido, which may be regarded as a colony, and where a large extent of land is not yet broken, and Formosa and Chosen, which were recently annexed, little more than 17 per cent may be taken as a fair estimate of the cultivated land. If we compare this percentage with 43 per cent for Belgium, 59 per cent for France, 49 per cent for Germany, or even 17 per cent for Switzerland, it will be seen how low is the percentage in Japan.

The following figures, according to recent

* Professor Rein in his work on 'Industrial Japan' much underrates the extent of terracing; he appears not to have seen it in Shikoku, Chiugoku, etc.

statistics, will show how much agricultural land is under cultivation (excepting Hokkaido, Formosa and Chosen):

	Cho*	Percentage of whole area
Land under crops	5,205,163.4	17.0
Forests	13,903,801.7	59.5
Hara† and grass land	1,950,582.0	1.5

* Cho = 10 tan = 2.5 acres.

† Grass land for forage and for manure is but very little used.

The land under cultivation is divided into "ta" (paddy fields) and "hata" (dry-land fields), the former amounting to 2,857,509.1 cho and the latter to 2,347,554.3 cho. Paddy fields are almost entirely devoted to rice. But rice is not the only crop which is cutivated in ta, for the climate in the larger part of the country is such that two crops a year can be obtained if the soil is sufficiently drained; indeed the recent government report shows that the area of ta under two crops is about 40 per cent. So-called "aftercrops" of rice consist now-a-days mainly of barleys, rape cultivation which formerly was extensively practised being now much decreased; and Gengeso or Rengeso (Astragalus siricus) cultivation, used as green manure, came gradually into use.

Dry-land fields are more variously cultivated. Their principal use is of course for the cultivation of food crops such as wheat, barley, upland rice, Indian corn, soybean, adzuki, Indian millets, buckwheat, sweet potatoes, potatoes, taro, radish (which is very different from the occidental radish, being much larger and longer), etc. Barley is mainly divided into two varieties, naked and with husk, the former being suited especially for warmer districts and that with husk for colder parts, but as naked barley is easier to handle, its cultivation seems to increase more and more, supplanting common barley. Common barley is much used as food for live stock and for other purposes, but its principal use is for human food; naked barley, on the other hand, being almost exclusively used for human food.

Industrial crops are cultivated with few exceptions, such as i (Juncus effusus) and Schichito i (Cyperus tegetiformis) in dry-land fields. Sugar-cane, cotton (which decreased from 55,541 cho in 1895 to 2,402.2 cho in 1914 on account of the amount of cotton imported), tea plant, ai (Polygonum tinctorium), hemp, tobacco, paper mulberry, rape, sesamun, wax-tree, ginseng, lacquer tree, peppermint are the principal industrial crops. The area of crops under cultivation and their productiveness in 1914, according to the government statistics (1916), are as follows:

	Cho	Koku
Rice	3,033,369	57,006,541
Barley	595,865	*10,253,615
Wheat	510,036	*5,349,513
Naked barley	705,928	*8,178,314
Foxtail millet	168,428	1,747,296
Barnyard millet	58,850	959,037
Proso millet	36,351	461,333
Small red bean (Adzuki)	130,003	912,636
Buckwheat	161,558	1,368,919
Rape seed	124,118	883,116
		Kwan
Potato	83,818	234,502,689
Sweet potato	305,014	981,108,069
Seed cotton	2,402	794,711
Hemp	11,017	2,525,184
Leaf indigo	4,513	2,180,365
Sugar cane	22,601	266,954,504
Tea	30,108	54,182,669
Tobacco leaf	36,182	15,265,725

* In the year 1915.

One of the most important crops, mulberry, was estimated in 1915 at 371,298 cho, and the number of lacquer trees at 918,092.

On dry-land fields, two crops may generally be taken and even three crops a year are not exceptional, especially in the warmer provinces. It may be remarked that most cereals can be, and indeed are, generally cultivated year after year in succession without fallowing, not only on paddy fields, but also on dry-land fields. Indeed rotation of crops is not much practised unless it is absolutely necessary with certain crops which will not bear cultivation successively. At present the area of fruit trees is fast increasing, among which may be mentioned mikan or Japanese oranges, pears, peaches, Kaki (Diosporya Kaki) apples, grapes, etc. Apples were introduced in the beginning of the Meiji era, and they are extensively cultivated, especially in the northeastern provinces and Hokkaido. Vegetables and flowers are much cultivated especially in the vicinity of towns and cities, but not within enclosure as in Europe, market gardens being all in open fields and not to be distinguished from common farms. There are special gardens, commonly within enclosures, where specialists called Wuyekiya (tree growers) raise ornamental trees and shrubs, flowers, special dwarf trees in pots, etc. These gardeners are distinguished from agriculturists.

Agricultural Implements.—Under so small and so intensive a farming it is no wonder that the implements used are so simple and so rude. The plow (Karasuki) "resembles in its commonest form that of Egypt, which is made and used to-day just as in the time of the Pharaohs." This statement by Professor Rein is true, but it is also true that it can cut very deep, even a foot or more, and for making high ridges it is very serviceable. There are many kinds of plows but they are seldom used on dry-land fields, the reason being that the "between crops" and "catch crops" make plowing very difficult; and besides the common forms of plows are not suitable for use on dry-land fields. Even on paddy fields plowing is not general, for there are yet many fields, especially in the northeastern provinces, which are undrained and covered with water the year around.

Instead of the harrow, farmers use "maguwa," which is a kind of rake. Except the plow, "maguwa" and the carts sometimes used, there are almost no agricultural implements used with the horse.

A hand implement for digging, used extensively, is "Kuwa," which is often erroneously translated hoe, but which may be properly named a broad-shared mattock. Kuwa is the simplest and most serviceable of all implements. With it the farmer can dig, break clods, pulverize the soil, even press the surface, make high ridges and small and shallow furrows for sowing in rows, cultivate between the rows, dig holes, etc. One of its kind named "Bitschukuwa" has its share divided into three or four teeth and is used to dig paddy fields when wet. Spades are used in some of the districts.

An implement especially constructed to cultivate between the rows of rice is named "Ganzume," and has long curved teeth and a short handle. Nowadays a hand implement named

"tawuchi-kuruma," which may be defined as a kind of roller with teeth around, came much in use as it works much quicker than weeding with hands as was usual. Harvesting is done entirely with a sickle (Kama). Cereals are threshed generally with a comb-like implement, (something like a flax rippler) "inekogi" or "mugikogi." Grains are chaffed with a specially constructed mill (momisuriusu).

Principal Manures.— From remote ages Japanese farmers have understood how to preserve the soil from exhaustion by using manure. The manure par excellence was and is human excrement. The water closet is generally provided commonly with two earthen jars, one to receive the excrement and another to receive the urine. Farmers reserve these two excreta, mixing both in a large earthen jar or tub, lightly roofing over to exclude rainwater and sunshine. After they have rotted and the urea is changed into ammonia, they are diluted with a large quantity of water and are spread upon the soil, or applied in various ways even directly to crops growing between the rows. They are often mixed in making compost.

Green manures are largely used, the most common form being grass cut from natural meadows called "magusaba," or from undergrass in forests. "Genge" and soybean are often sown in paddy fields and plowed in as green manure.

Compost manure also plays a great rôle. It is of many kinds, the principal of which is made of farmyard manure, often with a large quantity of grass used as litter. Compost is also made of earth mixed with dead leave from forests. In districts where farming is intensively conducted, compost is carefully made in a small hut especially constructed for the purpose.

Rape cake is extensively used and was formerly the only manure to be bought. It has now much decreased, but its place is more than replaced by soybean cake imported from China. Fish manures are extensively used, the principal of which is herring cake, dried sardine and sardine cake.

Rice cleanings are used as manure as well as for food for livestock. Wood and straw ashes are extensively used, formerly being the only potash manure. Lime is much used, especially in paddy fields in the warmer half of the country.

Recently great changes have been, and are now being experienced in the manurial world, so to say. Artificial manures are now extensively used, and many factories have been established to manufacture them, phosphatic minerals being imported from America and various islands. Three factories for lime-nitrogen are also established. Superphosphate alone, or with ammonia and potash salts, is sold under the name of artificial manure, complete manure, etc. Farmers in various provinces plan to use ammonia sulphate as manure.

Livestock.— Cattle and horses are as yet not so numerous as in occidental countries, and meat, milk, butter and cheese are not so extensively used. Milch cows are little kept by common farmers, but by special dairymen, who usually buy all food for these cows. Japanese cows have very poor milking quality, so that these dairymen depend entirely upon occidental breeds, such as Holstein, Ayrshire, Jersey, Swiss Brown, etc., or their crosses. Japanese breeds are very small but very good as working animals and farmers generally use cows instead of oxen. Their meat has a most excellent flavor.

More horses than cattle are used in agriculture, but they are small in size and of primitive breed. The number of cattle and horses in 1914, according to the statistics of 1916, was as follows: Cattle, 1,387,233; horses, 1,579,454. The government is giving the greatest attention, however, to the improvement of the livestock. Livestock other than cattle and horses are exceedingly small in number. Sheep were introduced less than 40 years ago but without much success, the result showing that, notwithstanding the humidity of the climate, they can be raised only with difficulty. The raising of pigs is being much encouraged, and the industry is increasing rapidly. In 1914 statistics give numbers as follows: Sheep, 2,771; goats, 95,323; pigs, 332,456.

Fowls are extensively kept by small farmers. Many varieties were introduced at various times during the Tokugawa shogunate but little care was given to breeding, and they all seem to have greatly degenerated. Great attention, however, is now being paid to breeding and many new varieties are introduced, and although quite a large number is kept, something like 1,000,000 yen of fowl eggs is imported every year from China. Duck-raising is not given much attention. Bees are kept in a few districts to some extent, but the art of keeping bees is yet in a very backward condition.

One of the most important industries of Japan is the silk industry, sericulture being extensively conducted by small farmers, who have plenty of labor well suited to it. Silk-worms are mainly divided into two kinds, common silkworms and wild silkworms, the former of which is raised within the house and is the principal one. The eggs, or graines, are raised exclusively by specialists, the art being a very difficult one. The egg-raisers have generally a very large house specially constructed and well fitted for sericulture. Farmers, on the other hand, generally use one or more rooms of their houses which they can spare during the season. Farmers often raise silkworms two or three times a year, and plant mulberry trees in plantations, around the fields, on road sides or near their dwellings.

General Features of Japanese Agriculture. — Japan with her oceanic climate, being located within the boundary of the monsoon, is well suited to rice cultivation, especially in the warmer portion. In the colder section, though rice is also the principal crop, its cultivation extending up to 43° 30′ N. lat., it is rather a risky crop owing to the shortness of summer — heat often being insufficient for its good maturing. The wheat and barley crops are also exceedingly risky, for during harvest time, which may be anywhere between the end of May and the beginning of July, the season is liable to be very wet.

Soils vary greatly, often changing within a mile. One kind of soil which deserves special notice contains a large percentage of volcanic ash, very light, with high water capacity and great absorptive power, and occurs to a large extent in Kuwanto and Kiushiu. As a rule, soils are not very rich and need to be carefully cultivated and well manured.

With such climate and soils, combined with

the mountainous character of the country, farming on a large scale cannot be profitable, which accounts for the small farms, the holdings on an average not being more than one cho, or 2.5 acres. Farms of more than five cho are rather rare exceptions.

Though there are many landlords in Japan, the land is much more equally distributed than in some parts of Europe. Nevertheless farmers cultivating small holdings are not all peasant proprietors, tenancy being by no means rare, which may be seen from the following table:

	Ta	Hata
Farming on own land....	49.04 per cent	60.09 per cent
Tenancy.....	50.96 per cent	39.91 per cent

These small farmers have to pay a heavy tax on each acre of land, central and local, and for tenants the rent is exceedingly high. The rent varies of course according to circumstances, but generally speaking it is equal to about one-half to two-thirds of the produce in the case of paddy fields, aftercrops being excluded. The rent is generally paid in kind, rice in the case of paddy fields; soybean, barley, or sometimes money, in the case of dry-land fields. Metayage is very rare, and the tenancy is such that the rent is fixed according to custom, its value changing only very gradually. Owing to various historical causes and also to the fact that paddy fields, if not well drained, are unsuitable for the erection of buildings, the houses, which often serve both as dwellings and farm buildings, or which are in close connection with the latter, are grouped together into villages or built along the roadside. There are almost no enclosed farms with buildings in the centre, and it is very difficult to make students in Japan understand the meaning of farm in the Occidental sense of the word. Paddy and dry-land fields are divided into small parcels, side by side, having no fences, the paddy fields being separated by small ridges designed to hold the water of irrigation on the surface. Each parcel has its owner, but the fields being scattered involves a great drawback to the economy of labor.

These small farmers, often with less than one cho of land, frequently cultivate only one crop of rice, which is sown in seedbeds at the end of April or at the beginning of May and planted mainly in the month of June. The harvest time is from September till November. Where two crops are obtained, the field is cultivated soon after the harvest, and harvest time comes just before rice planting. The farmer's working days are therefore very unequally distributed. Where they have to cultivate dry-land fields their labor is more equally distributed, but then the acreage they have to manage is often so small that the work on the farm is not enough for the full employment of their labor, and their income is naturally often not enough to live upon. So the farmers are obliged to resort to various industries other than farming. Formerly the farmers had to spin and weave their own clothes, but now that this is being done by factories, they have to seek other industries, such as sericulture, silk reeling, tea culture, mat making, sugar manufacture, starch manufacture, weaving rice-straw mats, making strawplait from barley, weaving cotton and silk goods as commercial articles, making baskets from bamboo stem and making wood-shaving plait, etc. Keeping fowls and swine must be enumerated among these by-industries of Japanese farmers; also forest culture to obtain material to make charcoal, wooden articles, fishery and fishing, etc.

Small farmers sell their labor to large farmers or to factories, if any such exists in the neighborhood, or seek employment elsewhere. These small farmers, little less than 70 per cent of whom cultivate below one cho, with plenty of labor, most naturally farm their land in the most intensive manner possible, thoroughly cultivating, weeding, manuring, which may fairly be designated as gardening. Indeed in rice culture farmers spend some 20 to 25 days' labor or more per tan, which is equal to 80 or 100 days' labor per acre. For other cereals some 15 days must be allowed per tan. It would seem that the product should be very large. But the statistics show but an ordinary average. For example, rice gives, on an average, about 1.7 koku of husked grain per tan, which is equal to about 34 bushels per acre; barley little less than 1.6 koku or 32 bushels per acre; wheat some 1 koku or 20 bushels per acre, which certainly are not good crops. The figures quoted above may be too low; on the other hand, even very poor soils are sometimes cultivated by industrious farmers, year after year, successively without fallowing, as already shown. The climate also is not suited to barley and wheat. These facts must lower the average. So that if we take a medium crop at two to three koku per tan for rice (40 to 60 bushels per acre), or even four koku or more per tan (90 bushels per acre), in very good soil, and two to three koku per tan for barley, we are probably more nearly right as regards the product of intensive farming.

Notwithstanding such intensive farming, land population is too dense, and small farmers can hardly subsist, especially those who hire the land under the burden of heavy rent, and those who live in the colder districts. Immigration, inland and abroad, and employment elsewhere are depended on to obviate the bad conditions, but improvement in agriculture and more extended employment in by-industries are absolutely necessary to these farmers.

Recent Progress of Agriculture.— With the downfall of the Shogunate and the opening of the country to foreign intercourse, great changes began to take place everywhere, both in political and in economical spheres. Under the influence of foreign trade and industrial development at home, the farmers lost some by-industries, such as spinning and weaving and some of their crops declined, as cotton, rape, ai, hemp, etc., but in many branches there has been great development and progress, as in sericulture and the tea industry, as the government statistics show.

The silk industry was formerly restricted to a few localities, but the export of raw silk has become so extensive that there is now almost no locality without some production of cocoons. So also with the tea industry, though much restricted. Tea was formerly produced in various localities, but had very small market. When, however, it found a foreign market its increase was very rapid; while the silk industry seems to have no limit for its expansion.

The following figures will show the progress in these two important industries:

Years	Cocoons, koku* (average per year)	Tea, kwan* (average per year)
1900–1904	2,648,413	7,033,598
1905–1909	3,262,212	7,325,315
1910–1914	4,318,469	8,691,093

* Koku = 5 bush. (dry), 48 gals. (liquid); kwan = 8.3 lbs. (avoir.).

The production of rice has undoubtedly increased very greatly, but the statistics show comparatively very small increase in the acreage of rice culture.

Years	Acreage (average per year) Cho	Husked rice (average per year) Koku
1900–1904	2,853,573	44,643,328
1905–1909	2,909,379	47,579,722
1910–1914	2,997,715	51,166,025

But when we remember that some 20 years ago 2.5 koku per tan was considered a tolerably good harvest, in the same districts less than three koku is not considered a good crop at present, and the harvest of more than four koku per tan is not rare. And it is not improbable that during recent 10 years it has increased, as some experts are inclined to think, some 50 per cent, which is much larger than is shown by the above statistics. Such a great progress is not to be wondered at when we consider that in recent years many new varieties have been introduced, and the quantity of manure used has been exceedingly large, the demand for which could not be satisfied without importing large quantities from abroad each year, amounting to more than some 36,000,000 yen.

Efforts have successfully been made to introduce many good breeds of livestock from Europe and America. Great improvement is noticed in the breeds of fowls, good breeds being largely introduced from abroad.

Farmers are becoming aware of the value and usefulness of science, and under the guidance of experts, directly or indirectly, they are making a gradual but constant improvement, which must of course result in increased production. Governments, central and local, are making constant effort to introduce improvements in agriculture and assist the farmer.

Agricultural education is encouraged. Agricultural instructions are given in the higher primary schools of villages and there are more than 7,000 continuation schools for agriculture, after the methods of the Fortbildings-schule of Germany. Agricultural schools are divided into two classes, higher and lower, almost every prefecture having one or more of the former, and various counties having the latter; special schools, especially for sericulture, horticulture and veterinary, not being wanting. There are at present three higher agricultural schools, two government establishments and one private school in Tokio established by the Agricultural Society of Japan. There are at present two university colleges, one in Tokio and another in Sapporo Each has a subsidiary course similar in grade to the higher agricultural schools. Agricultural courses are given in the common and higher normal schools. Local agricultural schools receive aid from the national funds. Agricultural courses of a few weeks are being given in various places of every prefecture. Lectures for farmers are well attended and show excellent results.

There are now three higher sericultural schools established by the government; in Tokio, in Wuyeda in Nagauo prefecture, and in Kioto, in the two former of which instruction in silk reeling is also given. There are also many local institutes intended to give sericultural instruction. Agricultural experiment stations are many. One central station with its branch stations is established by government; also one sericultural experiment station with five branches: (1) Agriculture proper; (2) agricultural chemistry; (3) agronomy; (4) vegetable pathology; (5) entomology. Almost every prefecture has an agricultural or sericultural experiment station; aid being given from the national fund; many countries and villages have trial fields; also private institutes are not wanting.

Agricultural societies are divided into village societies, county societies and prefecture societies, there being one in every prefecture, in every county, in nearly all villages, according to the law relating to agricultural societies, and aid is given from the national fund and often from local governments, counties and villages, and we have now a central, the Imperial Society. There are also many general and special societies aside from those established according to the law relating to agricultural associations.

Prefectures and counties, and even villages, often employ agricultural, dendrological, sericultural and other experts to give free lectures and suggestions to farmers, and the central and local governments often hold industrial and agricultural exhibitions.

The government is now making a great effore to promote co-operative societies, including credit societies. These societies are all exceedingly important for the small farmers of Japan and they now number more than 11,500. Besides the law passed in 1900 relating to industrial societies, there exists a law relating to associations for important products, a law relating to livestock associations and a law relating to tea industry associations, all of which seek to promote these respective industries on the basis of co-operative principles. Great efforts are also being made to promote sericulture by giving special instruction, and a law has been passed to prevent silkworm diseases by securing to the farmer good and sound eggs.

Among the means to promote the improvement of livestock, large pasture has been established in the Imperial domains where good breeds of horses and cattle are raised. The government has also established a zoo technical experiment station with its three branch stations, three stud farms and 15 stallion depots. Laws have been passed as follows: For the inspection of stallions (1897); for the prevention of animal plagues (1896); and for the prevention of bovine tuberculosis (1901).

Preventive and destructive means against injurious insects are under the guidance of experts and are gradually coming into use among farmers. A law designed to enforce, when necessary, the means for prevention was passed in 1896.

To prevent fraud in artificial manures, a law was passed providing for the supervision of all

commercial fertilizers and each prefecture has a chemical laboratory to analyze the manure whenever requested. Besides credit-societies to provide small capital, the government has established the Industrial Bank of Japan, which is a central and special *credit foncier* and local agricultural and industrial banks of similar nature. These banks lend capital for agricultural and other industries principally on mortgage, allowing a low interest on a long term.

Land improvements are now going on very rapidly with the aid of the national and local funds, especially to promote drainage and irrigation in paddy fields and to overcome the small size and irregular form of the land parcels, which has been a great drawback in tilling operations. To this end the law relating to adjustment of farm lands was promulgated in 1899, which has now in addition the aim to promote the clearing of land and drying of water to get more arable field. Finally it may be stated that many agricultural products are feeling the pressure from without, on account of the keen competition, which may result in reduced prices. Some think that sooner or later Japanese agriculture will be conducted on a large scale, but those who know the climate and the contour of the country do not believe that Japanese farming could be organized on the Occidental large farming system.

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19. THE JAPANESE ARMY. In 1868, the first year of Meiji, the Imperial Japanese Government was formed under the Emperor Meiji. It had seven departments, one of which was that of the navy and army. While the name of the department has been changed several times, naval and military officers have always formed one branch of the administration. In the year 1868, this department of the navy and army had come into the possession of the bureaus of the navy, army, construction, warships, ordnance, horse administration, military school and military administration. Next year it had the addition of the bureaus of account and courts-martial.

In 1871 military stations were established in Tokio, Tohoku, Osaka and Chinzei. At the same time took place the organization of the general staff bureau, naval school, shipbuilding office and other naval offices.

In 1872 the War Office was separated from the Navy Department and made an independent department. Two years later the number of military stations was increased from four to six and established at Tokio, Sendai, Nagoya, Osaka, Hiroshima and Kumamoto. At the time, however, the General Staff still formed a bureau of the War Office.

In 1875 military arsenals were established in Tokio and Osaka. In 1876 the Artillery Council was organized. In 1878 the General Staff Office was separated from the War Office, there being added the hydrographic and kindred offices, compilation, translation and survey, together with a library. Two years afterward a telegraph section was added to the General Staff Office.

In 1881 gendarmerie headquarters were established in Tokio. In the following year a military staff college was established under the direction of the General Staff Office. In 1883 an Engineering Council was organized.

In January 1882, an Imperial rescript was given by His Majesty to his army and navy as their mottoes: Concerning Loyalty, Courtesy, Bravery, Faith, and Thrift.

Meanwhile, the Department of Military Training being established, the affairs on training has gone under the Inspector-General of Military Training; the military administration, under the War Minister; and all the rest, under the Chief of General Staff.

In 1886 a thorough reorganization of the War Office took place. It now consisted of the Minister's secretariates and bureaus of general affairs, cavalry, artillery, engineering, account and medical affairs. Toward the end of that year a special fortification department was organized.

In 1888 the military stations were converted into Division Headquarters. At this time, the War Office established the woolen factory now existing at Senju. In 1890 the Imperial Bodyguard Headquarters were organized.

During 1895 there existed, as an outcome of the Chino-Japanese War, a special quarantine department. In June, offices having charge of the construction of telegraphs and lighthouses in Formosa were established and a military office was organized under the direction of the governor-general of Formosa.

In 1896 the number of army divisions in Japan was increased from 6 to 12, and Totoku-fu (offices of General Superintendence) were created for the eastern, central and western sections of Japan.

In 1898 the Gensui-fu (Council of Field-marshals and Fleet Admirals) and the Headquarters of Military Education were organized.

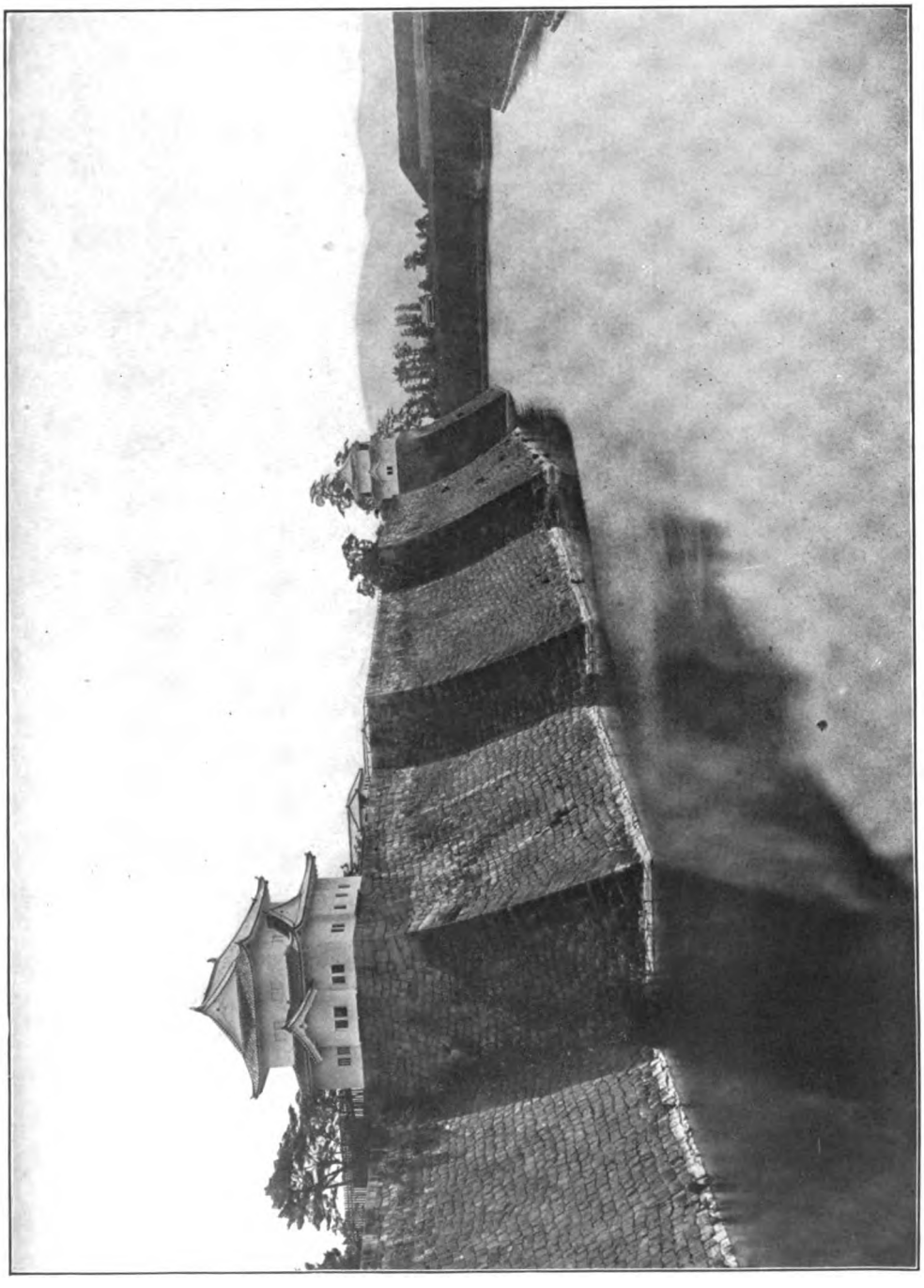
The War Office was reorganized in 1900, with new bureaus, viz., those of general affairs, personnel, military affairs, supply and justice. The Military Supply Depot was established in 1902.

In 1903 the Artillery and Engineering Councils were abolished. Branches of the Supply Depot were established at Ujina and Osaka. On 28 December of that year the Regulations of the Imperial Military Headquarters in Time of War and of the Military Council were amended.

On 13 Jan. 1904, the Totoku-fu were abolished. On 21 February, shortly after the outbreak of the war (1904), a bureau of information relating to prisoners of war was established in Tokio. On 24 April the Tokio Garrison Headquarters were newly organized. On 23 June, a special military quarantine office was established in Tokio, and quarantine stations were opened in Ni-no-shima and Dairi in November.

In 1905 a special military Central Exchequer was organized. Shortly after the opening of the war depots for the Russian prisoners of war were established at Matsuyama, Himeji, Fukuchiyama, Shizuoka, Hamadera, Navashino and other places, the total number of such depots being 29. A military quarantine station was newly established at Wada Point, Kobe, in September.

On 31 July 1906 the Regulations of the Military Department of the Government-General of Kwantung and of the Headquarters of the Military Forces in Korea were enacted. On 6 August the Regulations of the Homes for



Osaka Castle

VIEWS OF THE NATIONAL EXPOSITION OF INDUSTRY, OSAKA

1 The Midway, looking toward the Art Gallery

2 The Art Gallery

Crippled Soldiers were enacted. For the time being the home is established in Tokio.

In 1907 and 1916 two divisions were increased, the whole number of divisions at present being 21.

In 1907 there were added two brigades of cavalry, one brigade of field artillery, three battalions of mountain artillery and one brigade of communication corps.

Thenceforward, communication brigade being expanded, now it consists of one railway regiment, one battalion of aviation, and wireless corps; they are respectively stationed at Nakano, Chiba and Tokorozawa.

In 1909 a temporary office for the investigation of aviation was established.

In consequence of the reorganization of 1910, the War Office consists now of Secretariate and six bureaus: Military Affairs, Personnel, Ordnance, Medical, Intendance and Justice.

The number of officers (active service) in 1915 was as following:

General	157
Gendarme	236
Infantry	7,244
Cavalry	682
Artillery	1,995
Sappers	693
Commissariats	486
Comptrollers	1,035
Surgeons	1,243
Veterinarians	270
Band corps	5

Military Supply System — Clothing.— Offices for supplying clothing for the army are controlled by the clothing and provisions section in the Comptroller's Bureau of the War Office. There is also the clothing depot, being a central executive organ. Cloth is manufactured at the Senju woolen factory, belonging to the army. The War Office gives clothing materials and money every year to the army, offices and schools, and causes them to regulate the supply among themselves. With the material and money, clothes are made for non-commissioned officers, soldiers and students.

Provisions and Fodder.— The clothing and provisions section of the Comptroller's Bureau of the War Office controls affairs relating to the supply of provisions and fodder to the army. There exists also the provisions and fodder depot as a central executive organ. Provisions and fodder required by the army are procured by the Division Comptrollers' departments, and those for other official establishments and schools by their respective directors. Military bodies are given fixed amounts of provisions and fodder and of money, as also are schools with dormitories, and are allowed to manage their own supply business. The food is supplied after cooking by the military bodies and schools. The supply of fodder is managed in a similar way.

Factories — Military Arsenal.— The military arsenal engages in the manufacture and repair of arms required by the army and ammunition required by the navy. It is governed by the military inspector of arms.

There are military arsenals in Tokio and Osaka. The Tokio arsenal manufactures rifles, cartridges and gun-equipment, and governs gunpowder manufactories at Meguro, Itabashi, Iwahana and Atsuda, all near to Tokio. The Osaka arsenal makes guns, gun-carriages, shot and accessories, and governs the Ujina gunpowder manufactory and the Moji manufactory of arms. Branches of the arsenals, when deemed necessary, are established at the places where the branch arms depots exist. The Artillery and Engineering School belongs to the Tokio Military Arsenal.

Senju Woolen Factory.— This factory manufactures cloth required by the army and is governed by the Minister of War. It is managed as a special account.

Clothing Depot.— This depot procures cloth mainly from the Senju woolen factory and makes it into military clothes. The depot also procures sundry goods and cloth from the public and supplies the army.

Provisions and Fodder Depot.— This depot conducts the business relating to provisions and fodder to be used in time of war. The examination of such provisions and fodder is conducted here.

Horse Administration.— The history of the supply of horses to the Japanese army can be divided into three periods. In the first period (1868–72) grown horses were acquired from the public and supplied to the army; in the second period (1873–80) grown horses were purchased from the public and supplied to the army after they had been trained; and in the third period (1881 to the present) young horses have been procured and supplied as military horses after being reared as such. The army has a military horse supply department, under the direction of the Minister of War. This department engages in the purchase, training, supply and investigation of supply resources of military horses. The department has a head office at Tokio and nine branch offices in horse counties. The purchase of horses is conducted by purchase officers who are dispatched from Tokio to Hokkaido, Akita, Aomori, Iwate, Miyagi, Fukushima, Tochigi, Kagoshima and other prefectures every year, in the spring and autumn. In order to maintain these horses, all branch offices of the Horse Supply Department have their own pastures, to the extent of about 143,000 acres.

Supply of Personnel — Officers.— In the early stage of the army, as organized after the Restoration of the Imperial Régime, military officers were appointed from among the officers in the military forces of different clans and from among the people in general. The method of obtaining military officers underwent many changes before the present system was organized. At present officers of infantry, cavalry, artillery, sappers and commissariat troops are selected from among the following classes after the necessary education with the colors and at the Military College: (1) Graduates from the Central Military Preparatory School. (2) Graduates from a Middle School or from a school of an equal or higher grade, who have passed an examination for the service. (3) One-year volunteers bearing testimonial of the commander of their corps and who have passed an examination for the service. (4) Non-commissioned officers of all arms in active service, who are of good behavior and recommendable character, who bear testimonials of the commander of their corps, and who have passed an examination for the service. (Graduates

from the Central Military Preparatory School are those who have received three years' education at a local military preparatory school and one year and nine months' education at the Central Military Preparatory School. Students of the local military preparatory schools are selected from among boys of 13 to 15 years of age who aspire to be military officers).

Gendarme (officer) are filled up from among offices of other branches of service.

Officers of the Military Comptrollers' Department are obtained from the following classes, after the necessary education with an infantry corps and at the Military Comptrollers' School: (1) Graduates from a middle school, or from a school of an equal or higher grade, who have passed an examination for the service. (2) One-year volunteers who bear testimonials of the commander of their corps and who have passed an examination for the service. (3) Non-commissioned officers in the comptrollers' department in active service, who are of good behavior and recommendable character, who bear testimonials of the commander of their corps and who have passed an examination for the service.

Officers in the hygienic department are obtained from the following classes, after the necessary training with an infantry corps and at a military hospital: (1) Graduates from the Medical College of the Imperial universities, from the special medical schools or from the prefectural medical schools with the recognition of the Minister of Education as of an equal or higher grade than middle school, who have applied for the military service and who have been educated at those schools at the request of the army. (2) Graduates from the above schools, or those who have acquired equal qualifications at foreign schools, who apply for service. (3) Those one-year volunteers who bear a license as medical practitioners or pharmaceutists and who apply for service.

Officers of the veterinary department are obtained from among the following classes, after the necessary education with a mounted corps: (1) Graduates from the veterinary departments of the College of Agriculture of the Imperial University or of the Government Special Industrial School (Jitsugyo Semmon Gakko), who have applied for service and were educated at those schools at the request of the army. (2) Graduates from the above schools, or those who have obtained equal qualifications at a foreign school, who apply for service. (3) One-year volunteers who possess the license of veterinary surgeon, and who apply for service.

Officers of military bands are promoted from among those who have served in the military bands for three years or more and whose merits are recognized.

Non-commissioned Officers.— In the early stage of the modern Japanese army, non-commissioned officers were recruited in the same manner as officers. Under the present system non-commissioned officers of gendarmerie are recruited as follows: (1) First-class privates of gendarmerie in active service who have been in the gendarmerie service for more than two years and whose behavior is good and character recommendable. (2) Non-commissioned officers of infantry, cavalry, artillery, sappers and commissariat troops (excepting various artisan corps), who have been in active service for more than six years after joining the colors, who are of good behavior and of recommendable character; who have applied for admission into the gendarmerie department, and have passed the necessary examination and who still have a margin of age for active service to the extent of more than one year. (3) Gendarmerie corporals or sergeants in reserve, who are of good behavior and recommendable character and who apply for active service within one year after the expiration of their term for active service. (4) Reserve corporal or sergeant of infantry, cavalry, artillery, sappers or commissariat troops who have been in active service for more than six years, who are of good behavior and recommendable character, and who, applying for the position of non-commissioned officer of gendarmerie, have passed an examination for the service.

Reserves of non-commissioned officers of infantry, cavalry, artillery, sappers and commissariat troops are as follows: (1) Soldiers of all arms in active service who apply for renewed service as non-commissioned officers, and those troops in the Tsushima Garrison who apply for permission to be with the colors until their term for active service expires and who are fit for such service. (2) Reserve first-class privates who while with the colors have discharged the duties of corporal and who apply for the position of non-commissioned officer within one year after the expiration of their term for active service. (3) Reserve first-class privates, who possess a certificate showing capability to discharge the duties of a non-commissioned officer and who apply for such position in less than one year after the expiration of term for active service. (4) Reserve sergeants or corporals who apply for active service in less than one year after the expiration of their term for active service.

Artificers (N. C. O.) are obtained from among those persons who are not in the reserve of the navy or army or first year privates of all arms, who have passed an examination for the service and gone through the necessary education at the artillery and engineering school.

Non-commissioned officers of horseshoemakers are drafted from horseshoe-makers in the second or third years of active service in cavalry, artillery or commissariat troops, who apply for renewed service and who are fit. They are then given nine months' education at the veterinary school, in order to become chief horseshoe-makers.

Non-commissioned officers in the hygienic department are obtained from the following groups of men: (1) Ambulance hands or soldiers of any arm in active service, who apply for renewed service as non-commissioned officers in the hygienic department, or men in the Tsushima garrison who desire to remain with the colors until the expiration of their term of active service, and who are fit for the position of non-commissioned officers. (2) Ambulance men in reserve, who while in active service have been chief nurses, and who apply for the position of non-commissioned officers in active service in less than one year after the expiration of their term of active service. (3) Ambulance men in reserve who possess a certificate

qualifying them for the position of non-commissioned officers and who apply for active service within one year after the expiration of their term for active service. (4) Second and third class chief nurses in reserve who apply to enter active service within one year after the expiration of their term for active service.

Non-commissioned officers in the comptroller's department are taken from the following: (1) Non-commissioned officers attached to corps of all arms who apply to be such officers in the comptroller's department, and first-class privates who have been in active service for two years or more after joining the colors and who have applied for renewed service as non-commissioned officers in the comptrollers' department and obtained the necessary knowledge for such position. (2) Reserve first-class privates of all arms, who while in the active service have acted as accountants, and who apply for the position of non-commissioned officer in active service within one year after the expiration of their term of active service. (3) Reserve non-commissioned officers or first-class privates of all arms who possess a certificate showing their fitness to be non-commissioned officers in the comptrollers' department, and who apply for such position in active service within one year after the expiration of their term for active service. (4) Second or third-class accountants in reserve, who apply to enter active service within one year after the expiration of their term of active service.

Non-commissioned officers in military bands are drafted from bandsmen who have been in active service for more than two years and who are sufficiently accomplished to be non-commissioned officers.

Privates.— In the early period of the Meiji era soldiers were recruited from all clans according to the amount of revenue of their lord. In 1873 the Conscription Law was promulgated, and all men in the country were entered in the army list on their reaching the age of 20. This laid the foundation of the present Japanese army. The law was amended several times, but its spirit remained the same. The present system provides: (1) All Japanese male subjects between 17 and 40 years of age are responsible for military service. (2) The army is classified into regulars, second-reserves, recruits and national army. (3) The regular service is divided into active and first reserve services. The active service is for three years beginning with the 20th year of age. The first reserve service is for four years and four months, for those who have finished the active service. (4) The second reserve service is for 10 years, and enlists those who have finished the regular service. (5) Recruit service is for 12 years and four months and enlists a required number of the surplus men over the required number of regulars each year. (6) The national army service is divided into first and second national army services. The first national army includes the second reserves and trained recruits who have finished their term of service. The second national army is constituted by those who are enlisted in either of the above services.

Men are drafted independent of the Conscription Law as follows: (1) First-class privates of gendarmerie are obtained from among soldiers of other branches of the army by their application. (2) Bandsmen are obtained from graduates from the Military Bandsmen's School.

Military Education.— Military education in Japan is given in the following schools: (1) Military Staff College; three years' course, admits about 60 students a year. (2) Military College of Artillery and Engineering; three years' course, admits 120 students a year. (3) Military College; 18 months' course, admits 450 students a year. This is a cadets' school. (4) Military Toyama School; soldiers are taught tactics, shooting, fencing and gymnastics in a two to seven months' course; number of students varies from year to year. (5) Central Military Preparatory School; two years' course, admits 300 students a year. (6) Local Military Preparatory Schools; exist in Sendai, Nagoya, Osaka, Hiroshima and Kumamoto; three years' course, admits 50 students a year. (7) Military Cavalry Practice School; 11 months' course to be given to cavalrymen; number of students varies. (8) Military Field Artillery Practice School; two and three months' course, number of students varies. (9) Military Siege Artillery Practice School; course two months to one year. (10) Telegraph Educational Battalion; courses, one year and 18 months. (11) Military Comptrollers' School; accountant cadets and accountant officers are taught here; the course for the former is one year nine months, and that for the latter one year. (12) Military Surgeons' School; course for officers covers four months at the most and that for cadets one year. (13) Military Veterinary School; course three to nine months. (14) Military Artillery and Engineering School; trains non-commissioned officers; courses, one and two years. (15) Infantry Practice School; teaches infantry tactics for, mainly, infantry officers. The admission number of students and course in above mentioned schools would be varied from time to time.

Court-Martial.—In 1871, when the military stations were established and regular troops enlisted for the first time in Japan, a naval and military criminal code was enacted. In the following year the War Office was established and a military law court came into existence. The present military penal code was promulgated in 1883 and amended in 1888.

In the Japanese military law court or court-martial the provisions not only of the military penal code, but of the ordinary criminal law and other penal regulations are applied.

There exists two sorts of courts-martial; one is the Higher Court-martial and the other is the Division Court-martial, the latter existing in each division. The Higher Court-martial exists in Tokio and delivers judgment in offenses committed by generals, and conducts the re-examination of cases examined by the Division Court-martial. Trial by courts-martial is not open to the public. Neither debate nor prosecution is allowed. Counsel and appeal are prohibited.

Military justice is conducted by procurators, secretaries and judges, and presided over by the Minister of War in the case of the Higher Court-martial, and by the commander of division in the case of Division Court-martial. Secretaries are civil officials and execute duties resembling those of preliminary judge in the ordinary law courts. Judgment is given by five judges, all of whom are military officers. Sec-

retaries may participate in trial but have no voice in making decision. Procurators are also outside the court-martial, strictly speaking. Judgment becomes valid by sanction by the commander of division or of the emperor, according to the official status of the offender.

Besides those above mentioned, courts-martial are established in Formosa and in field armies and forts in time of war. They are similarly constituted on the whole as the Division Court-martial. With the progress of the military organization and general litigation system in Japan, the courts-martial will be gradually improved.

Military Prisons.—The organization of military prisons was enacted in 1876 for the first time. It was amended several times, the latest amendment taking place in 1894. Military prisons exist in those places where exists a court-martial, and are governed by the officers who preside over the court-martial. The staff of a military prison consists of a director, clerks, chief jailor and jailors. In military prisons are imprisoned small offenders who are in active service or military officials still retaining their official positions, and defendants in criminal cases. The prison building is divided into three sections, rooms for defendants, cells for convicts and detention houses. The military prison is so conducted as to execute penalties in a most appropriate way against military offenders, that is, with a view to the maintenance of the military spirit and discipline.

Sanitation.—In 1868, the first year of Meiji, a naval and military department was established in the imperial government, and in October, the same year, a soldiers' provisionary hospital was founded in Tokio. This forms the beginning of the hospital system of the Japanese army. In February 1870 another military hospital was established in Osaka. At the time military surgeons were engaged in the treatment of patients as well as in teaching subordinate physicians. These hospitals gave medicine not only to soldiers, but to the general public. In 1871 a Bureau of Naval and Military Surgeons was organized in the War Office, and was ordered to control all affairs relating to medicine for the army in the whole empire. At the same time regulations relating to the organization of military hospitals were published. The bureau of surgeons, above mentioned, was placed under the direction of a surgeon of the rank of major-general. In those days surgeons were appointed by periodical examination from among ordinary physicians.

In 1872 military hospitals were established at each military station. The organization of the hygienic administration in the army underwent various modifications afterward. The present regulations of military hospitals were promulgated in February 1898.

According to the present system, military hospitals exist at all places where is stationed a military garrison. These hospitals not only give medical treatment to soldiers, but engage in storing and supplying medicines and medical instruments and in teaching non-commissioned officers and men of the hygienic department. According to their size and importance, the hospitals are divided into five classes. These hospitals are so constructed as to be able to take in as patients about 3.5 per cent of the total troops stationed at the place where the hospital exists.

The personnel of the hospital includes a director, surgeons, pharmaceutists, accountants, chief nurse, and nurses. The director of a military hospital is appointed from among surgeons of the rank of captain to colonel, inclusive. He is controlled by the chief surgeon of the division to which he belongs in the execution of his medical duties.

Veterinary Department.—At the beginning of the modern Japanese Army, veterinary affairs were conducted by the Bureau of Surgeons, and a regulation for providing cavalry, artillery, and other corps requiring horses, with veterinaries, was enacted. At the time veterinaries were draftetd from the general public. In 1873, an independent department of veterinaries was established, and the rank of veterinary officers fixed. In the following year, non-commissioned officers and men of the veterinary department were appointed. At first these non-commissioned officers and men were taken from graduates from the military veterinary school. But subsequently this school was ordered to devote itself to the supply of officers, and men of lower ranks were taken from among conscripts. At present this school gives training to horse-shoe-makers. The course in the school for officers is about five months, that for non-commissioned officers three months, and that for candidates for non-commissioned officers nine months.

LT.-GENERAL K. OSHIMA,
Minister of War in the Terauchi Cabinet.

20. THE NAVY. Naval affairs had been fairly well developed in Japan until the isolation policy of the Tokugawa Shogunate in 1635 prohibted the building of ocean-going vessels under pain of capital punishment.

A few ancient naval undertakings which are noteworthy in Japanese history are: The expedition of the Empress Jingo to Sankan (ancient Korea) in 200 A.D.; the fighting in the Inland Sea of Japan between the clans Gen and Hei in 1186; the Chinese attempt to invade Japan and the arrival of Kublai's armada on the coast of Kiushu and the annihilation of it in 1280; the encounters between the Japanese and Korean fleets on the southern coast of Korea on the occasion of Taiko's (Hideyoshi's) invasion of that peninsula in 1592–98. In the beginning of the 17th century the predatory visit of Japanese pirate junks to the coast of South China is notable and it was about that time also that Japanese junks sailed, for commercial purpose, to China, the Philippines, Java, Siam and India. The ocean-going vessels of Japan at that period numbered over 200.

It may perhaps be worth while to recall how warships of Western style were introduced into Japan.

In 1838 the Mito clan, obtaining some necessary information from a Dutchman (the Dutch were the only foreign traders who were allowed to come to Nagasaki until after the commercial treaty was made with the United States of America), built the first ship on a foreign model ever constructed in Japan. Although this ship was completed and named *Hitachi-maru* it was never allowed to be used.

After the visit of American men-of-war in 1853, the Tokugawa Shogunate permitted the

building of large ships, and at the same time ordered from Holland, through their trading agents, one steam corvette, one sailing corvette, with auxiliary steamers of different sizes; but these vessels did not arrive in Japan, owing to the trouble existing in Europe at that time.

In 1854 a two-masted ship, the *Howo-maru* (length 130 feet, beam 30 feet) was built at Uraga, on an English model; and at about the same time two more were built, one at Yedo (Tokio), the other at Satsuma, both of which were planned on European models.

At the time of the Crimean War a Russian sloop was wrecked on the coast of Japan, and permission was given that Japanese workmen might be employed in repairing the vessel; this gave an opportunity to obtain some practical working knowledge of Western naval architecture.

In 1855 His Majesty the King of Holland presented a steam corvette to the Tokugawa Shogun, which was named the *Kanko-kan*. At this time the Japanese ensign Himomaru (the sun or a red ball in a white ground) was introduced, and has been used as the national flag ever since.

Subsequently the naval school was established at Nagasaki by the Tokugawa Shogunate, and instruction in naval matters was given there by Dutch naval officers. The students for admission to this school were appointed by the Shogunate, and also selected by the different clans. Another naval school was organized at Yedo with *Kanko-maru* as a training ship, and employed both Dutch and English officers as instructors. Some new ships were built at Nagasaki, and two ships were bought abroad, one of which named the *Kanrin-maru* afterward (1860) made a cruise to San Francisco manned by Japanese officers and crew under Captain Katsu (late Count Katsu).

In 1857 Her Majesty Queen Victoria presented a steam yacht to the Tokugawa Shogun, and it was named the *Hanrio-kan*.

In this way the navy of the Tokugawa Shogunate was slowly gathered together and organized, and in 1867 nine men-of-war and 36 auxiliary vessels were on the list (besides the ships belonging to the different clans).

Then came the War of Restoration (1867), and most of the ships of the Tokugawa Shogunate, except the iron-clad *Kotetsu* (old *Stonewall Jackson*), led by Admiral Yenomoto (the rebel chief), fled to Yezo Island (Hokkaido) and fought a battle at Hakodate which resulted in the total destruction of the rebel fleet, which, however, had lost some of their best ships before the battle.

After the War of Restoration the clans in possession of the warships presented them to His Majesty's government, and the Imperial Navy was formed and organized in 1867–70. The ships in 1872 were 20 in number, the aggregate tonnage being 12,390 tons.

The Imperial Navy had experienced a few engagements before the war with China in 1894–1895, such as the Formosan Expedition of 1874; the bombardment and capture of Yeisojo in Korea by H. I. M. S. *Unyo* in 1875; the Satsuma Rebellion in 1877.

At the time of the war between Japan and China in 1894, the Japanese naval force consisted of one small iron-clad of 3,777 tons displacement; three coast-defense cruisers (Itsukushima class) of 4,278 tons; one second class cruiser (*Yoshino*) of 4,216 tons; four protected cruisers of between 2,230 and 3,700 tons; 11 corvette and gunboats of between 1,000 and 2,000 tons; and 25 torpedo boats. The aggregate tonnage of the above was 59,006 tons.*

The most noted engagements of the China-Japan War were: The opening engagement off Asan, Korea; the battle of the Yalu; the torpedo-boat attack at Wei-hai-wei; the occupation of the Pescadores, Takao and Ampin.

After the China-Japan War the Japanese navy commenced the building of battleships and cruisers under the new scheme to increase its strength, and at the outbreak of the war between Japan and Russia in 1904, the Japanese force consisted of six battleships of 13,000–15,000 tons; eight armored cruisers of 7,700–10,000 tons; 14 protected cruisers of 3,000–4,800 tons; 10 coast-defense ships of 7,000 tons and under; 19 gunboats, etc., of 2,000 tons and under; 19 torpedo-boat destroyers and 87 torpedo boats. The aggregate tonnage of the above was about 270,000 tons.

At the end of the Russo-Japan War, the loss sustained by Japan was as follows: two battleships; two protected cruisers; two coast-defense ships; four gun vessels, etc.; two torpedo-boat detroyers; and nine torpedo boats. The captured Russian men-of-war, etc., augmented the Japanese navy as follows: six battleships of 9,600–13,500 tons; one armored cruiser of 7,700 tons; two protected cruisers of 6,600 tons; two coast-defense ships of 4,900 tons; two torpedo gunboats of 400 tons; and three torpedo-boat destroyers.

The Naval Administration.—At first, after the Restoration, the Imperial Army and Navy were controlled by one department; but in 1872, in the process of organization, they were made separate and independent departments of the government.

The management and control of the Imperial Navy is carried out under the direction of the Minister of Marine, who is appointed from the flag officers. Being a member of the Cabinet, he is directly responsible to the emperor for all actions of the Ministry of Marine. He acts in naval matters concerning the movement of ships, schemes of mobilization, national defense and naval intelligence, in consultation with the chief of the Naval General Staff.

The Naval General Staff Department is independent of the Ministry of Marine, its chief being under the direct control of H. I. M. the emperor.

There are seven bureaus in the Ministry of Marine: Military Affairs, Personnel, Material, Steam-Engineering, Medical, General Account Provision and Clothing, and Justice.

There are also four departments under command of the Minister of Marine: The Department of Technics, the Department of Naval Education, the Department of Works and Buildings and the Department of Hydrography.

Naval Stations and Dockyards.— The coast of the empire is divided into five naval

*The Chinese naval force at the same period was 81 ships, 77,389 tons, and 25 torpedo boats, 1,042 tons; but at the conclusion of the war most of the Chinese men-of-war and torpedo boats were either destroyed or surrendered and only the Nanyang and Kanton fleets, insignificant in power, were saved.

districts, and the headquarters of each is placed at the chief naval port of that district called Chinjufu (naval station). Headquarters of the first naval district is at Yokosuka, the second at Kure, the third at Sasebo, the fourth at Maizuru and the fifth at Chinkai (the fifth naval district is controlled by the Sasebo-Chinfufu for the time being). There are also four Yōkōbu (secondary naval station); Bako (Pescadores Islands), Ryojun (Port Arthur), Chinkai (Korea) and Ominato (Awomori Bay).

Each Chinjufu is commanded by an admiral, who is commander-in-chief, and the following official functions are under his control: The personal staff, consisting of the chief of staff, adjutants, aide-de-camp, inspector of signal stations, recruiting officers, etc.; the arsenal (dockyards, ordnance and torpedo factory and depot, general supply stores); the accountant department (including works and buildings, provision and clothing stores), the hospital; the naval barrack; the torpedo division; the steam reserve; port office; court-martial.

The secondary naval stations are organized on a smaller scale and have the means of small repairs for torpedo crafts, etc.

The arsenals and their present capacity is as follows: Kure—able to build armored and unarmored ships, engines and guns of any size; to furnish armor plates, torpedoes and ammunition. Yokosuka—able to build armored and unarmored ships and engines of any size; and make all kinds of repairs to ships and armaments. Sasebo and Maizuru—able to build ships of moderate size and make all kinds of repairs to ships and armaments. Tokio—the manufacture of small stores for ordnance and torpedoes, and some special articles. (The arsenal at Tokio does not belong to any naval station).

Personnel.—For the fiscal year ending April 1917 the number of officers and men voted for the Imperial navy was as follows: Officers, 4,773; warrant officers, 1,574; petty officers and men 65,047. Number of officers on the retired list is 1,192; number of petty officers and men in reserve, 26,882; number of naval reserve (men trained in merchant service and passed as midshipmen and petty officers) is 2,426.

The officers of the Imperial navy are divided into two classes, the executive and non-executive officers. The executive naval officers are admirals, captains, commanders, lieutenant-commanders, lieutenants, sub-lieutenants, midshipmen, naval cadets, gunners and boatswains. The non-executive naval officers are engineer officers (engineer-admiral, engineer-captain, engineer-commander, etc.); medical officers; paymasters; naval constructors; ordnance engineers; hydrographical engineers; carpenters; bandmasters and warranted writers.

Executive Officers.—In the Imperial Japanese navy the naval cadets are appointed by competitive examination, which is open to the sons of all Japanese subjects. The entrance examination is held, at present, in 13 of the principal towns of the country, under the supervision of the superintendent of the Naval College. The number of cadetships available for the year having been previously gazetted by the Minister of Marine, applications are made to the superintendent of the Naval College through the local authorities within the specified limit of time. A candidate must not be under 16 or over 20 years of age. A candidate is examined in the following subjects: Japanese composition, mathematics, English, Chinese, geography, history, physics, chemistry and drawing; also, if the candidate desires, in French, German or Russian. Successful candidates become naval cadets and join the Naval College at Yetajima, on the Inland Sea near the Kure naval station. The traveling money to the college is paid, and at the college everything is provided by the government.

The cadets remain in the Naval College three years, and are instructed in seamanship, navigation, higher mathematics, English, physics, chemistry, gunnery and torpedoes, steam engineering, etc.

After having passed the final examination successfully they are appointed to the sea-going training-ships as midshipmen. At the end of eight months' cruising the midshipmen are examined in what they have learned on board, and then transferred to different ships in commission and after four months' practical service, if favorably reported by the captain of each ship, will be commissioned as sub-lieutenant.

Promotion of naval officers is entirely by selection, and the list of candidates deserving that honor is decided upon by the board of admirals, which meets once a year. This board is composed of eight or nine members, but when sitting to decide the list of promotions, all the commanders-in-chief of naval stations and the squadrons, with the senior officers of the different branches, such as engineers and medical corps, etc., are summoned, and the Minister of Marine takes the chair. Officers of the following rank who have been on duty for the specified number of years are eligible for nomination: Sub-lieutenants, one year; lieutenants, junior grade, two years; lieutenants, five years; lieutenant-commanders, two years; commanders, two years; captains, two years; rear-admirals, three years.

Naval officers are placed on the retired list on account of age. The age-limit of the different ranks is as follows: Admirals at the age of 65; surgeons, paymasters and constructors with the rank of vice-admiral, at the age of 62; vice-admirals and engineer-vice-admirals at the age of 60; surgeons, paymasters, and constructors with the rank of rear-admiral at the age of 58; rear admirals and engineer-rear-admirals at the age of 56; surgeons paymasters and constructors with the rank of captain at the age of 54; captains, engineer-captains and hydrographical engineers with the rank of captain at the age of 52; surgeons, paymasters, constructors with the rank of commander and chief warrant officers at the age of 50; commanders, engineer-commanders, hydrographical engineers of the same rank, and warrant officers at the age of 48; surgeons, paymasters and constructors with the rank of lieutenant-commander at the age of 47; lieutenant-commanders, engineer-lieutenant-commanders and hydrographical engineers of the same rank at the age of 45; surgeons, paymasters and constructors with the rank of lieutenant at the age of 44; lieutenants, engineer-lieutenants and hydrographical engineers of the same rank at the age of 43; surgeons, paymasters and constructors with the rank of lieutenant (junior grade) at the age of 40; lieutenants (junior grade), sub-lieutenants, engineer-lieutenants

(junior grade), engineer-sub-lieutenants and hydrographical engineers of the same rank at the age of 38, all officers are placed on non-service pension list five years after being placed on the retired list.

Engineering Officers.— The appointment of engineer students is effected in the same manner as the appointment of naval cadets. The students joining the Naval College of Engineering remain three years, going through a course of advanced mathematics, physics, chemistry, theory of the steam engine, etc. They also receive practical training in the engineering workshops of the Yokosuka dockyard, receiving instruction in iron shipbuilding, the working of marine engines and boilers, the practical use of the various instruments used in the engine-room, as well as in the construction and working of electric light, torpedo and gun machinery. The students successfully passing the final examination are appointed to the sea-going training ship as engineer-midshipmen, and they get commission as engineer-sub-lieutenants in the same way as midshipmen, gaining succeeding steps of promotion, as in the case of executive officers.

Medical Officers.— Candidates for the medical branch of the navy are required to pass a medical examination before being allowed to go up for the competitive examinations. The latter include medicine, surgery, science and modern languages. Successful candidates become probationary assistant surgeons of the navy, and have to join the Navy Medical College for instruction. They remain there not less than one year, and if they pass the examination at the college successfully, are appointed to the hospitals of the different naval stations. After a certain period of time, if recommended, they are commissioned as assistant surgeons; succeeding steps of promotion are by selection. The successive grades of rank are assistant-surgeon, surgeon, staff and fleet surgeon, surgeon-inspector and surgeon-general. Surgeons and assistant surgeons are also appointed from among the graduates of the Imperial universities and medical colleges respectively.

Paymasters.— Paymasters are brought up in the paymaster school, the students being selected in a similar manner as the engineer students and after three years' education at the school they become probationary assistant paymasters, and after one year practical training are commissioned as assistant paymasters, gaining succeeding steps of promotion by selection. Ranking is as follows: Assistant paymasters, paymasters, chief, staff and fleet paymasters, paymaster-inspectors and paymaster-general. The paymasters and assistant paymasters are also appointed from among the graduates of the universities and commercial colleges respectively, when vacancy occurs.

Naval Constructors.— Every year a certain number of the naval architecture students from the Imperial University can make application to become students of the navy. The expenses of the successful candidates are paid by the navy, and on being graduated they are appointed assistant naval constructors. Promotions to naval constructor, chief inspector and inspector-general of naval construction are gained by selection.

Ordnance Engineers.— Ordnance engineers are appointed in the same manner as naval constructors. Naval officers and engineers can also enter this branch by special appointment if desired.

Hydrographical Engineers.— Students in this branch are taught in the hydrographical office the theory and practice of surveys, etc., and, passing a successful examination, are appointed assistants. Assistants can acquire rank as high as that of captain. As this branch of the service can be performed by naval officers, the continuance of this department is doubtful.

Warrant Officers.— The executive warrant officers are gunners and boatswains, gunners and torpedo-gunners having to have their qualification of gunnery or torpedo instructions before promotion. The non-executive branches holding relative ranks are engine-room artificers, bandmasters, carpenters, writers and nurses. They are all selected from the petty officers of their respective bodies, having served at least two years at sea. A warrant officer of more than ordinary ability can, after six years of service, be promoted to be chief warrant officer which ranks with sub-lieutenant, and chief warrant officers of long and meritorious service receive the rank of lieutenant when placed on the reserve list.

Petty Officers and Men.— The petty officers and the men of the navy are divided in the same method as the warrant officers. Petty officers, with the exception of the writers, are all appointed from the men. There are three ranks in every branch — viz.: The chief or first, second and third class petty officers. The men are enlisted in two classes, the volunteers and the conscripts; the first serve for eight years, the second for four. Both classes are allowed to renew their enlistment for terms of three years until the petty officers reach the age of 45, and the men that of 40 years of age. Men appointed to be petty officers must serve six years from the day of appointment. The age of enlistment for volunteers is as follows: Seamen and stokers, 17 to 21 years; carpenters' crew, nurses, blacksmiths, etc., 17 to 26 years; bandsmen 16 to 19 years. The age of conscripts must be over 20.

Examinations for the promotion of petty officers and men are held twice every year, and they are eligible for the examination if they have served at sea as follows: Petty officers — First class or chief petty officers, one and a half years as second class petty officers; second class, one year as third class petty officers; third class, one year as leading seamen. Men— Petty officers, leading seamen or first class men, able seamen or second class men, and ordinary or third class men, are examined in April and October. Boys are examined in May and November. Boys are trained for four months in the naval barracks at each naval station, and then sent to the sea-going training-ships for two months at least before being distributed among the ships of the squadron, etc. From among able seamen and upwards to first class petty officers inclusive, a certain number of men are selected and examined to become seamen gunners and torpedo men, and the successful candidates are trained respectively at the gunnery and torpedo-training stations at Yokosuka.

There are three different courses of instruc-

tion for seamen gunners, torpedo men, torpedo instructors, etc.: (1) A course for seamen gunners; (2) a course for gunnery instructors; (3) recapitulatory, or short course. Stokers, carpenters' crews and blacksmiths are given the same instruction as seamen, and are trained in the artificers' training station according to their standing as seamen. Further details of the instruction of other branches of petty officers and men are unnecessary, it being similar in principle to that given for the seamen class.

The Naval Academy.—Advanced instruction for naval officers and engineers is given at the Naval Academy situated at Tokio. It is conducted by a rear-admiral superintendent and several instructors and officers of different ranks, as well as by a staff of professors. The courses of instruction for officer students are divided as follows: (1) Officers' long course, two years; (2) officers' short course, one year; (3) optional course, one year (nearly); (4) engineer's long course, two years; (5) engineers' short course, one year.

Officer students are nominated by the commander-in-chief of naval stations and squadrons, and by officers having similar authority, according to a notice given once a year by the Minister of Marine. A candidate for a long course must have had experience of sea duty for three years, be in good health, possess good judgment and a fair knowledge of his profession, and have a good record. Officer students for the optional course are not nominated, but make application, stating the subjects to be studied, and permission is granted them by the Minister of Marine if he sees no objection. Officer students of this class include captains, commanders, and lieutenants.

The principal subjects taught at the academy for officers are: (1) Strategy; (2) naval tactics; (3) military tactics; (4) history of war; (5) ordnance and machinery, including gunnery, torpedoes, naval architecture, steam engines, hydraulic and electric machinery; (6) navigation, meteorology, coast survey, etc.; (7) fortification; (8) land survey; (9) navy and military administration; (10) international law.

Preparatory subjects are advanced mathematics, dynamics, physics, applied dynamics.

Optional subjects are criminal law of the navy, modern languages, photography.

The subjects for engineer officers are, first part: (1) Steam engines; (2) practical engineering; (3) designing of engines and machinery; (4) naval architecture; (5) construction of ordnance.

Second part. (1) Theory of steam engineering; (2) kinematics of machinery; (3) strength of material; (4) resistance and propulsion; (5) hydrodynamics and hydraulic machinery; (6) electricity and electric machinery and apparatus.

Preparatory subjects are mathematics, dynamics, physics, chemistry, metallurgy.

Optional subjects are criminal law of the navy, modern languages, photography.

Officers choosing the optional course may select any of the subjects enumerated above, but the selection thereof must be made at the time of application.

Naval Expenditure.—The expenditure for the Imperial navy is divided into two classes: Ordinary expenditure, and extraordinary expenditure. The ordinary expenditure is for the maintenance of the navy, and the extraordinary expenditure for construction and new establishments.

The following figures will give some idea of the increase in expenditures of the Imperial navy since 1870, compared with the tonnage of the ships:

FISCAL YEAR	Expenditures		Tonnage
	Ordinary, yen	Extraordinary, yen	
1870	886,856	.....	13,767
1880	2,817,912	291,890	25,727
1890	5,412,491	4,089,201	61,763
1900	19,484,952	24,494,374	255,497
1901	21,063,345	15,262,843	258,077
1902	21,530,237	14,587,619	263,077
1903	8,132,720	12,480,498	298,222
1904	12,332,139	11,079,801	280,524
1905	28,914,073	11,693,495	367,894
1906	33,414,695	49,067,524	426,234
1907	31,292,235	40,979,383	513,351
1908	34,347,699	37,230,748	505,109
1909	35,143,415	35,902,959	505,206
1910	38,359,312	45,481,219	524,273
1911	40,208,251	60,255,366	536,054
1912	41,533,600	53,951,538	585,574
1913	38,885,701	57,559,890	631,346
1914	30,398,898	52,861,106	654,346
1915	38,998,117	45,396,342	690,302
1916	*46,496,165	*55,747,761	.....

* Estimates.

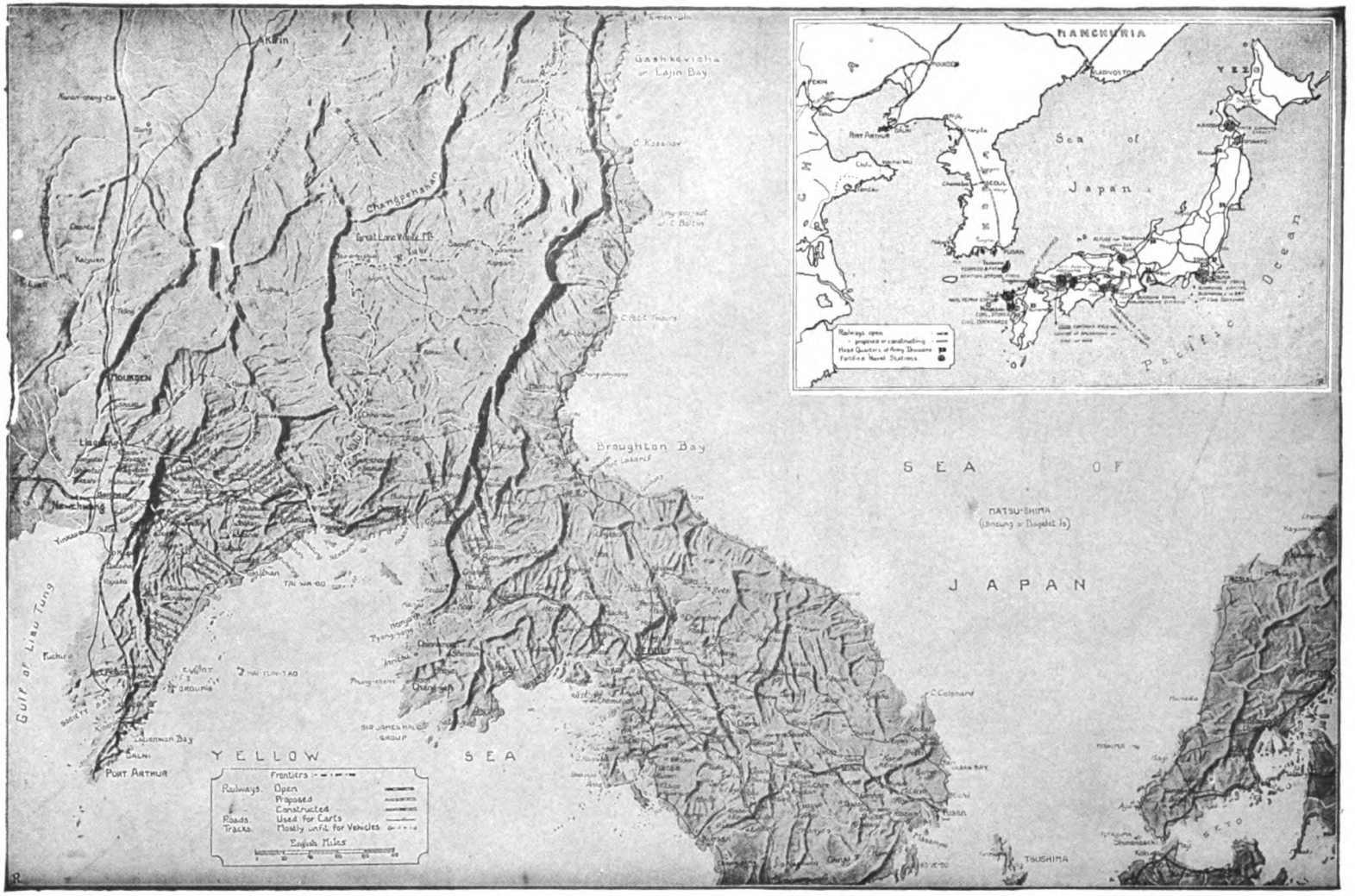
The special naval expenditures of Japan-China War and Russo-Japan War were as follows: Japan-China War (1894–95), 35,955,137 yen; Russo-Japan War (1904–05), 239,578,251 yen.

Besides the ordinary and extraordinary expenditure, the navy has special funds amounting to 3,000,000 yen for ship-building and ordnance construction materials, which are divided among the dock-yards and arsenals as the material funds.

BARON M. SAITO,
Admiral, Imperial Japanese Navy.

21. RUSSO-JAPANESE WAR. Causes of the War.—The Russo-Japanese War was caused by the conflict of interests between the two nations owing to the pursuance by Russia of a policy of expansion in the Far East.

Commencing the colonization of Siberia from the latter part of the 16th century, Russia steadily advanced toward the East, until after about a century she succeeded in the subjugation of nearly the whole of that vast region. She then advanced into Manchuria, with the result that China objected to her action and the Nertchinsk Treaty, by which the boundary line between the two countries was fixed, was concluded on 27 Aug. 1689. By virtue of this treaty, Russia had to withdraw from the Amur region, which she had occupied, and was checked from seeking an outlet on the Pacific coast for about a century and a half. This did not mean, however, that Russia abandoned her Eastern policy, and with the appointment of Muravieff to the governorship of eastern Siberia in 1847, she began to move toward the southeast, and by way of the Amur at last reached the Sea of Okotsk. On 16 May 1854, she concluded the Treaty of Aigun with China, by which she annexed the district to the north of the Amur. Two years after, when China was invaded by the allied



RELIEF MAP OF THE FIELD OF RUSSO-JAPANESE WAR

From a Map Prepared by the Intelligence Bureau of the War Department of Japan

troops of Great Britain and France, General Ignatieff, the then Russian Ambassador at Peking, took the opportunity to win the good will of the Chinese government by intervening between China and her enemies. In return for this service, the Treaty of Peking was signed on 2 Nov. 1860, by which Russia took possession of the district east of the Usuri, and thus for the first time in her history expanded her dominion to the coast washed by the Sea of Japan. She now founded the city of Vladivostock, which she made the basis for carrying out her long-cherished Far Eastern policy.

But as the long distance between Saint Petersburg and Vladivostock proved impeditive in many ways to the successful realization of her scheme, Russia determined to connect the two cities by rail. Thus the construction of the Siberian Railway was commenced in May 1891 and finished about 10 years later. Russia now found herself in possession of a powerful instrument in realizing her policy, but she was not satisfied, for being ice-bound in winter Vladivostock was not suited to her commercial and strategical purposes. Russia, therefore, wished to get an ice-free port somewhere in the south and waited for an opportunity to attain that object.

In 1894 the Japan-China War broke out and in the following year, by the Treaty of Shimonoseki, China agreed to cede to Japan the Liaotung Peninsula. Seeing in this a great obstacle to the pursuance of her policy, Russia, backed by Germany and France, coerced Japan to return the Liaotung Peninsula to its original owner, which act of Russia was viewed by the Japanese people with anything but gratitude.

In 1896 Russia signed a secret treaty, the celebrated Cassini Treaty, with China, by which she obtained the privilege of constructing railways in Manchuria. She founded the Eastern Chinese Railway Company, and immediately set herself to the work of building railways in that region. In December 1897, she took another decided step forward. She occupied Port Arthur and Talien, the very places from which she had ousted Japan, obtained the formal lease of the two ports from China on 27 March of the following year, and immediately began to equip them with armaments.

In 1900 the Boxer rising took place in China, which was quelled by the allied troops of the Western Powers and Japan. Russia, which had now completed her two lines of railway in Manchuria, seized the opportunity to send out a large force to that region on the pretext of guarding the railway, and after the Boxer disturbances were over refused to withdraw her troops. Thus she not only continued the practical occupation of Manchuria, but, gradually increasing pressure on Korea by encroaching on the Yalu as well as by diplomacy in Seoul, menaced most seriously the independence of that kingdom. As a matter of fact, Russia's ambition on Korea was not a new thing. After the conclusion of the Japan-China War, M. Waeber, the then Russian Minister at Seoul, left nothing undone to extend Russia's influence in the Korean court by utilizing the anti-Japanese faction. Subsequently, M. Speyer, who succeeded M. Waeber as the representative of Russia in Korea, attempted to get practical control over the financial and military power of that country. This attempt, however, was frustrated owing to a strong protest made by Japan and Great Britain. During the years following the Japan-China War, no less than three agreements had been arrived at between Russia and Japan, and at last it looked as if Russia was going to slacken her pace. As soon, however, as her plans were matured in Manchuria, her activities again began to show themselves in Korea, in many cases completely ignoring the agreements above referred to.

The attitude of the Japanese government toward this state of affairs is best expressed by the following quotations from Baron Komura's dispatch to the late Japanese Minister in Saint Petersburg. He says: "The unconditional and permanent occupation of Manchuria by Russia would create a state of things prejudicial to the security and interest of Japan. The principle of equal opportunity would thereby be annulled and the territorial integrity of China impaired. There is, however, a still more serious consideration for the Japanese government. That is to say, if Russia was established on the flank of Korea, it would be a constant menace to the separate existence of that empire, or at least make Russia the dominant power in Korea. Korea is an important outpost in Japan's line of defense, and Japan consequently considers her independence absolutely essential to her own repose and safety. Moreover, the political as well as commercial and industrial interests and influence which Japan possesses in Korea are paramount over those of other powers. These interests and influences, having regard to her own security, Japan cannot consent to surrender to, or share with, another power."

The Japanese government, however, was eager for peace and made overtures to the Russian government in July 1903 to come to a friendly agreement concerning the settlement of the Manchurian and Korean problems. Having obtained the consent of the Russian government, a memorandum was drafted which would form the basis of agreement.

The main points in the memorandum were (1) that Russia and Japan should both respect the independence and territorial integrity of China and Korea and maintain the principle of equal opportunity toward all nations; (2) that the two nations should reciprocally recognize Japan's preponderating interests in Korea and Russia's special interests in railway enterprises in Manchuria, and that each had right to take such measures as was necessary for the protection of their respective interests; (3) that each nation was free to send troops to protect the interests mentioned above; (4) that Russia should recognize the exclusive right of Japan to advise and assist Korea in the interest of civil and military reform. Against this memorandum Russia sent on 3 October a counter proposal demanding that Japan recognize Manchuria to be outside her sphere of interest and forego her exclusive right to assist Korea in making military reform, and that Japan and Russia should mutually engage not to use Korea for strategical purposes, as well as to consider that part of Korea lying to the north of the 39th parallel as a neutral zone.

Besides, Russia quietly suppressed in this counter note the important clause providing for equal opportunity for the commerce and indus-

try of all nations. On the receipt of this counter note the Japanese government, after several conferences with Baron Rosen, the then Russian Minister in Tokio, proposed a fresh memorandum containing the "irreducible minimum," which was accordingly communicated to the Russian government on the last day of October. In this new memorandum Japan made several important concessions: (1) Japan would engage not to undertake on the coast of Korea any military works capable of menacing the freedom of navigation in the Korean Straits; (2) she would agree to the proposal of Russia to create a neutral zone, but that said zone to be created at the Korean-Manchurian frontier and to extend 50 kilometers on each side; (3) that Russia and Japan should mutually declare that Korea was beyond the sphere of the "special" interest of Russia and Manchuria of Japan.

To this note Russia replied only on 11 December. In this new counter note Russia was entirely silent on the subject of Manchuria, and regarding Korea repeated the restrictions proposed in September, including the restriction of Japan's giving advice and assistance on military matters. On 21 December Japan made her last attempt to come to terms with Russia, and M. Kurino, the then Japanese Minister to Saint Petersburg, was instructed to present a *note verbale* to the Russian Foreign Minister. In this *note verbale* the Russian government was requested to reconsider her contention that Japan had no right to have a voice in the affairs of Manchuria and that Japanese assistance to Korea be limited to civil affairs only; besides Japan finally requested Russia to give up the idea of creating a neutral zone out of the Korean territory north of the 39th parallel. To this Russia gave reply which reached Tokio on 6 Jan. 1904, again insisting that Japan should recognize Manchuria as beyond her sphere of influence; that Japan should agree to the Russian proposal of creating a neutral zone in North Korea; that Japan should be accorded full right to the privileges according to the existing treaties, but no right to establish settlements; and no mention was made of China's territorial integrity in Manchuria.

Against this the Japanese government made another proposal on 13 January making further concessions, such as giving up the claim to special interest in Manchuria, provided Russia agreed to grant full privilege for the enjoyment of treaty rights acquired from the Chinese government besides giving up her claim to special interests in Korea. But to this last proposal Russia kept postponing reply, while reports of Russian military preparation on the Yalu side of Manchuria kept coming.

On 1 February the governor of Vladivostock warned the Japanese commercial agent there to prepare for withdrawing his compatriots. Under these circumstances it seemed doubtful to Japan whether the Russian government was really sincere and wished an amicable agreement. The Japanese government felt that it had made all possible concessions in the interest of peace, and on 5 Feb. 1904 sent a note informing the Russian government of the severance of friendly relations between the two countries. On 10 February Minister Kurino withdrew from Saint Petersburg, while Baron Rosen, the then Russian Minister at Tokio, left the Japanese capital on the following day.

Opening of Hostilities.— No sooner was Russia informed of the severance of friendly relations than Japan prepared for hostilities. In order to assume the offensive attitude, it was necessary for Japan to hold the command of the sea. With that object in view, the naval authorities organized a combined fleet consisting of four divisions.

Vice-Admiral Togo, who shortly before had been appointed commander-in-chief of the combined squadrons, left Sasebo on board his flagship *Mikasa* on 6 February with the entire fleet. Russia's Pacific squadron consisted at that time of 57 vessels, whose aggregate tonnage was about 190,000 tons, while Japan possessed 76 warships with an aggregate tonnage of about 270,000. The main strength of the Russian fleet was then concentrated at Port Arthur, only two vessels being stationed at Chemulpho and three others at Vladivostock. The main strength of the Japanese fleet went to attack the enemy's squadron at Port Arthur. It was found that most of the Russian warships were at anchor on roadstead outside the harbor of Port Arthur. During the night of 8 February, 18 Japanese destroyers approached those warships and by torpedoing greatly damaged the *Retvizan* and two other vessels. On the following day the fleet again opened fire on the Russian ships, and after an indecisive engagement, withdrew to its base in the Korean Sea. Previous to this, the Fourth Division of the fleet, commanded by Rear-Admiral Uryu, went to Chemulpho and by summoning out the Russian gunboat *Coreets* and the cruiser *Varyeg* engaged them in battle in the neighborhood of the island of Phalmi on the 9th and greatly damaged them. After 35 minutes' action the Russian ships were compelled to return to Chemulpho, where shortly after the two ships blew up.

By these two naval actions Japan secured the supremacy of the sea, so that henceforth her troops could be sent free of danger to any place in Korea and Manchuria. On the 10th the war was formally declared by the emperors of both powers and on the 12th Japan established military and naval headquarters in the Imperial Palace at Tokio.

Operations of the Manchurian Armies.— Under the escort of a squadron commanded by Rear-Admiral Uryu, the advance-guards of the Japanese army, which consisted of four battalions, landed at Chemulpho on 8 February, and passing through Seoul rapidly advanced northward and occupied Phyng-yang, which is a town of the greatest strategical importance between Seoul and Wiju, a town on the left bank of the Yalu. By that time some Russian troops had been advancing southward and made their appearance on 28 February at a point about five miles north of Tsi-sing-wan, one of the gates of Phyng-yang. A skirmish with the Japanese outposts took place, in which the Russians were repulsed. This was the first land engagement of the war. The Japanese troops, now greatly augmented by contingents which constantly arrived, marched northward, and having occupied Wiju on 3 April concentrated on the left bank of the Yalu. These constituted the First Army, being made up of three divisions, with General

Kuroki as the commander-in-chief. The Russians, who had occupied the right bank of the river, concentrated their main strength at Kiuliencheng and tried to prevent the Japanese from crossing the river. In face of incessant and heavy firing of the enemy, however, the troops succeeded in constructing a bridge across the river and by means of this bridge carried out the general attack of the enemy's position at Kiuliencheng on 1 May. Severe fighting, lasting for more than two hours, took place, resulting in the complete victory of the attackers. The Russians, who were greatly outnumbered, fled, hotly pursued by the Japanese, who captured Feng-hwan-cheng on 6 May and continued to advance in the direction of Liaoyang. Hsihoyen, to the east of Liaoyang, was the key to the defense of that city. The Russians had stationed three brigades there and defended the place with the greatest tenacity. But Japanese troops belonging to the Twelfth Division made a most fierce attack and compelled the Russians to evacuate the place on 18 July. Thus by the beginning of August the Japanese were already menacing Liaoyang. Previous to this, the Independent Tenth Division, commanded by Lieutenant-General Kawamura, which had the mission of connecting different armies assigned to it, landed at Takushan on 19 May, and cooperating with a detachment of the First Army occupied Sinyen on 8 June. By this time the organization of the Fourth Army was completed, with General Nozu as commander. It landed at Nauchienao and joined the Tenth Division at Sinyen. The combined army now advanced by way of Fenshuiling, and after occupying Tohmucheng, turned northward and pressed on toward Liaoyang.

The Second Army, led by General Oku, landed in Liaotung Peninsula at Yentaao on 5 May, being charged with the task of bringing pressure on the rear of Port Arthur. About the middle of the peninsula there is a narrow isthmus, on which a high hill called Nan-Shan stands, and at its foot is a town called Kinchow. It is a place of the greatest strategical importance, constituting the first barrier to Port Arthur. General Stoessel, commander of the Port Arthur garrison, resolved to retain it at all cost, so that he might respond to the advance of the relief army from the north on the one hand and defend Talien on the other. For several weeks past he had spared no pains to fortify the hill by digging trenches, mounting heavy cannon, laying subterranean mines and wire entanglements and adopting every other method of defense known to military science. Against this strongly defended hill General Oku hurled three divisions on 26 May, and with the co-operation of three Japanese warships, which fired on the enemy from the sea, succeeded in dislodging the Russians from their position after a fierce battle. In this way Port Arthur was completely isolated. The Russians in the direction of Liaoyang thought to recover the hill in order to restore communication between the south and north. With that object in view they concentrated their strength to the north of Wafangtien. The Japanese turned to the north to meet them and fought a battle at Tehlitz on 16 June, inflicting a crushing defeat on the enemy. The Japanese then pressed on Kaiping and after three days' fighting occupied the town on 9 July. Subsequently they marched farther north and by taking possession of Haicheng and Niuchwang on 3 August menaced Liaoyang.

Thus, the First, Second and Fourth Japanese armies won victory after victory, and now marched on Liaoyang from three sides; while the Third Army under General Nogi took the place of the Second Army in pressing the siege of Port Arthur.

The Siege of Port Arthur.— Soon after Russia leased Port Arthur from China she commenced to convert it into one of the strongest fortresses in the world. She built there many forts and mounted on them guns of various calibres, quick-firing guns, machine guns and heavy cannon. Between each fort, trenches or tunnels were built for communication, and in front of the forts covered trenches, wire entanglements, subterranean mines, abatises and other means of defense were prepared. In fact, Port Arthur was armed to the teeth with every description of the latest and most powerful of weapons and defended by every means which human ingenuity could devise, while a great army and a powerful fleet, commanded by General Stoessel and Admiral Stark, respectively, were awaiting the attack of the Japanese. There is little wonder that in the course of the Russo-Japanese War the Japanese found Port Arthur the hardest nut they had to crack.

Beginning with the attack made on 8 February, the Japanese fleet repeatedly essayed its strength against Port Arthur. On 13 February, in face of a great snowstorm, it attempted a torpedo attack, but without much avail. It then attempted to block the entrance to the harbor by sinking steamers there. The first attempt was made on 24 February, when four steamers were sunk at the entrance. Later three more similar attempts were made, in which the Japanese were partly successful. One remarkable fact in connection with those daring blocking attempts was that officers and men vied with each other to take part in the task, which meant almost certain death. As a matter of fact, more than 2,000 officers and men volunteered to serve in the third attempt. On 13 April, several Russian warships suddenly emerged out of the harbor and appeared to be attempting to escape, but being met by the Japanese fleet with heavy firing steamed back to the harbor.

It was at this time that the Russian flagship *Petropavlovsk*, striking one of the mechanical mines which had been laid by the Japanese the previous night, exploded and sank. Vice-Admiral Makaroff, who had succeeded Admiral Stark as commander-in-chief of the Russian fleet some time before, was on board the *Petropavlovsk*, and was drowned with more than 600 of her officers and crew. The Japanese, however, were not free of similar disasters. On 12 May the dispatch-boat *Miyako* struck a Russian mine and sank while engaged in clearing the Talien harbor of mines. Three days after, the cruiser *Yoshino* sank off Port Arthur in consequence of a collision during a thick fog with the cruiser *Kasuga*. On the same dav the battleships *Hatsuse* and *Yashima*, two of the most powerful ships of the Japanese navy, were destroyed, having struck the enemy's mines; and to add to these misfortunes, the gunboat *Oshima* and the destroyer *Akatsuki* were also

lost. In spite of these repeated disasters the Japanese commanders continued to harass the enemy with greater vigor than before. On 26 May, when the town of Kinchow was taken, thus isolating Port Arthur, Vice-Admiral Togo declared blockade over the coast of Liaotung between Pitszwo and Pulantien, and while keeping up a vigilant watch over those vessels which attempted to smuggle provisions and ammunition to Port Arthur, greatly assisted the land force in harassing the enemy. On 10 August the whole of the enemy's fleet attempted to escape from Port Arthur. The Japanese fleet met them about 30 miles off Port Arthur and in a fierce battle which ensued inflicted heavy damage. For instance, the Russian flagship *Cesarevitch* was greatly injured and Rear-Admiral Vithoft was killed. Other Russian ships also sustained severe damage and steamed back to the harbor of Port Arthur, except four which made good their escape to Kiaochow and elsewhere. After this great naval engagement the Russian fleet lay concealed in the harbor and never again attempted to escape.

On 6 June, General Nogi landed at Liaotung Peninsula at the head of the Third Army, and starting from Kinchow, which had been occupied by the Second Army, advanced southward, pressing the rear of Port Arthur by the beginning of August. The Russian garrison in that fortress was now apparently doomed. On 16 August a *parlementaire* was sent by the Japanese army to the commander of the fortress communicating to him the Imperial wishes with regard to the disposal of non-combatants and also counseling his surrender. On the following day the enemy replied to the communication, refusing either to deliver the non-combatants or to surrender. So the Japanese army opened a general attack on the fortress on the 19th. A bloody fight followed, which lasted till the 23d. The Russians held their positions with great tenacity and courage, and the Japanese were only able to capture the East and West forts of Panlungshan at great cost. The attack on the North Fort of Tungkeikwanshan proved most costly, the losses sustained by the Japanese being extraordinarily heavy. Under these circumstances the Japanese concluded that Port Arthur could not be taken by storm and resolved to carry on a long siege.

Japanese Naval Operations in the Direction of Vladivostock and Saghalien.—At the beginning of the war, the Russians had three warships at Vladivostock and were ready to meet the Japanese on the sea by the co-operation of the Vladivostock squadron and the Port Arthur squadron. On 6 March Vice-Admiral Kamimura, commander of the Second Squadron, led seven warships to a bombardment of Vladivostock. The enemy's ships, however, did not venture out and give battle. On 25 April they unsuspectedly made their appearance off Gensan, Korea, and attacked and sank the *Kinshumaru*, a Japanese transport. On 15 June they again sank another transport, the *Hidachi-maru*, and on 30 June some of their torpedo boats raided Gensan. Despite these frequent appearances, they successfully eluded the Japanese warships, until on 14 August they were caught by the Kamimura squadron off Ulsan, Korea, while they were steaming southward. In the engagement which followed, the *Rurik*, one of the Russian cruisers, was sunk and two others were heavily damaged. The Vladivostock squadron then became entirely inactive.

The Russian cruiser *Novik*, which had escaped to Kiaochow from Port Arthur after the naval engagement on 10 August, was requested by the German authorities there to leave the port. In consequence she left Kiaochow and for some time her whereabouts was unknown. It was later found that she was proceeding toward Vladivostock by a roundabout way on the Pacific. The Japanese cruisers *Tsushima* and *Chitose* at once gave chase and, overtaking her at Korsakoff, in Saghalien, completely disabled her.

The Battles of Liaoyang and of the Shaho.— The first goal of Japan's Manchurian armies was Liaoyang. As the different armies approached it there arose the necessity of establishing headquarters, which should control and direct their movements. Thus, on 24 June, the headquarters of the Manchurian armies were created with Marshal Oyama as the head and General Kodama as chief of the staff. They left Tokio for the front on 6 July. In the meantime, General Kuropatkin, commander-in-chief of the Russian armies in Manchuria, had his headquarters between Liaoyang and Mukden, and was trying to check the advance of the Japanese armies. At the beginning of August, Japan's First Army was at Yushulingtsz and Yangtzling, the Second at Haicheng and the Fourth at Tohmucheng. Marshal Oyama made the First Army the left wing, the Fourth Army the centre and the Second Army the right wing, and ordered a general advance on Liaoyang, so that by about 23 or 24 August the Japanese armies found themselves in the vicinity of Liaoyang. Confronting them the enemy had Lieutenant-General Stackelberg with three army corps opposed to the Second and Fourth Japanese armies, Lieutenant-General Ivanoff with two army corps opposed to the First Army, and General Kuropatkin with all the reserve forces stationed outside Liaoyang, besides providing a flying column to meet a flanking attack. On 25 August the Japanese right wing opened fire on the Russians, and steadily defeating them pushed forward until on 1 and 2 September it occupied positions behind Liaoyang. In the meantime the Japanese Central Army and left wing also operated against the enemy. They dislodged him from his positions at Anshantien and Sheushampao one after another, and hotly pursuing pressed on Liaoyang. It was originally the plan of the Russians to rendezvous their retreating troops at Liaoyang, but due to the hot pursuit of the Japanese armies much confusion occurred among the Russians, and a great army, probably 250,000 strong, fled northward. By 4 September the Japanese armies completed the occupation of Liaoyang. The Japanese armies in this fight probably numbering 200,000. In this engagement the Japanese casualties were roughly estimated at 18,000 and those of Russia at more than 25,000.

The news of the Russian defeat at Liaoyang caused consternation at Saint Petersburg, and at a conference held before the throne loud were the voices condemning General Kuropatkin. The result was that General Gripenberg, who had always been on bad terms with

Kuropatkin, was appointed commander of the Second Russian Army. Moreover, Kuropatkin was constantly urged to go to the relief of Port Arthur. In these circumstances Kuropatkin decided to take the offensive with the view of wiping out the disgrace he had sustained at Liaoyang. He led a great army southward and the battle of the Shaho ensued.

On that occasion the Russians marched against the Japanese positions by three different roads. On 9 October General Stackelberg, at the head of two army corps, attacked the Japanese right wing. This was the beginning of the great battle which continued to be fiercely fought in all directions until the 15th, there being some minor engagements till the 17th. Everywhere the Japanese were victorious and the Russians fell back in the direction of Mukden by taking three roads to the east of the railway.

After the battle of the Shaho the Japanese Manchurian armies remained inactive for some time, taking no step other than checking the advance of the enemy in the direction of the Shaho. Their intention was to wait for the fall of Port Arthur and join General Nogi's army to themselves, so that they might advance northward *en masse* and inflict a crushing defeat on the enemy.

The Fall of Port Arthur.— Since the first general attack made on 19 August the investing army of Port Arthur made altogether four general attacks on the fortress before 26 November. But every time the Russians offered a stubborn resistance, causing great losses to the Japanese. There is a hill known as the 203-metre hill at the northwestern extremity of the line of fortifications behind Port Arthur. It is the highest hill at the back of the fortress and from its summit the whole view of the harbor and town can be obtained. For this reason the hill is the key to the fate of the fortress. On the occasion of the second general attack the First Division attacked it with all its might for four consecutive days and nights, but failed to take possession of it after having lost heavily in its fighting strength. From 27 November the investing army again made another attempt to capture it, concentrating all the fires of its artillery and hurling column after column against it. A most fierce and bloody hand-to-hand fighting resulted, and at last during the night of the 30th a detachment of Japanese succeeded in carrying the hill. On the following day, however, the Russians returned to a counter-attack in great force and innumerable were the casualties on both sides. So heavy indeed were the losses that the sides of the hill were literally covered with the killed and wounded, and in order to recover them the *parlementaires* from the opposing forces met and arranged for a partial armistice.

After the killed and wounded were removed fighting was resumed with redoubled fury. It was only on 5 December that the Japanese succeeded in repulsing all the counter-attacks of the Russians and completing the occupation of the 203-metre hill.

When the 203-metre hill fell into the hands of the Japanese the fate of Port Arthur was practically sealed. Establishing a watchtower and mounting heavy cannon on its summit, the Japanese army bombarded the enemy's warships in the harbor day after day which, without having any shelter to protect them, were easily hit and sunk one after another. The *Sevastopol* and some other vessels, which had escaped beyond the range of cannon, were attacked with torpedoes and completely disabled, and by 11 December the Russian Pacific squadron was annihilated. Then the Tungk ikwanshan Fort was taken by the Japanese on the 16th, the Erhlungshan Fort on the 28th and the Sungshushan Fort on the 31st.

By this time the Russian garrison found itself in the last extremity of distress. Its store of food and ammunition was almost exhausted, it had no place to take in the wounded and sick, and its combatants were nearly worn out, due to unceasing fighting, with scarcely enough strength left to take up arms. In these circumstances General Stoessel saw no other way but to surrender. On 1 Jan. 1905, he sent a *parlementaire* to the Japanese army in order to negotiate terms of surrender. General Nogi, commander of the investing army, accepted the request and commissioned Major-General Ijichi, chief of his staff, to meet and discuss the terms of surrender with the Russian commissioner on the following day at Sinshiying. At this meeting the terms of surrender were agreed upon and signed by both commissioners. After all the fortifications and other military equipments had been duly delivered by the Russians into the hands of the Japanese, on 5 January General Stoessel came out of the fortress and met General Nogi. Previous to this, the emperor of Japan, on hearing of the capitulation of the Port Arthur garrison, magnanimously desired that, in appreciation of General Stoessel's arduous services for the sake of his country, he should be accorded all the honors of war. In consequence, General Stoessel and 536 officers were allowed to wear arms and return to Russia under obligation not to take part again in the present war. General Vock and a number of officers, however, refused to be released on parole, and were consequently sent to Japan as prisoners of war. Altogether 40,243 officers and rank and file were made prisoners of war.

Thus Port Arthur fell, and in consequence the blockade over the coast of Liaotung by the Japanese navy was discontinued and a Naval Admiralty was established at Port Arthur with Vice-Admiral Shibayama as commander, and on 15 January General Nogi made the formal entry into the fortress.

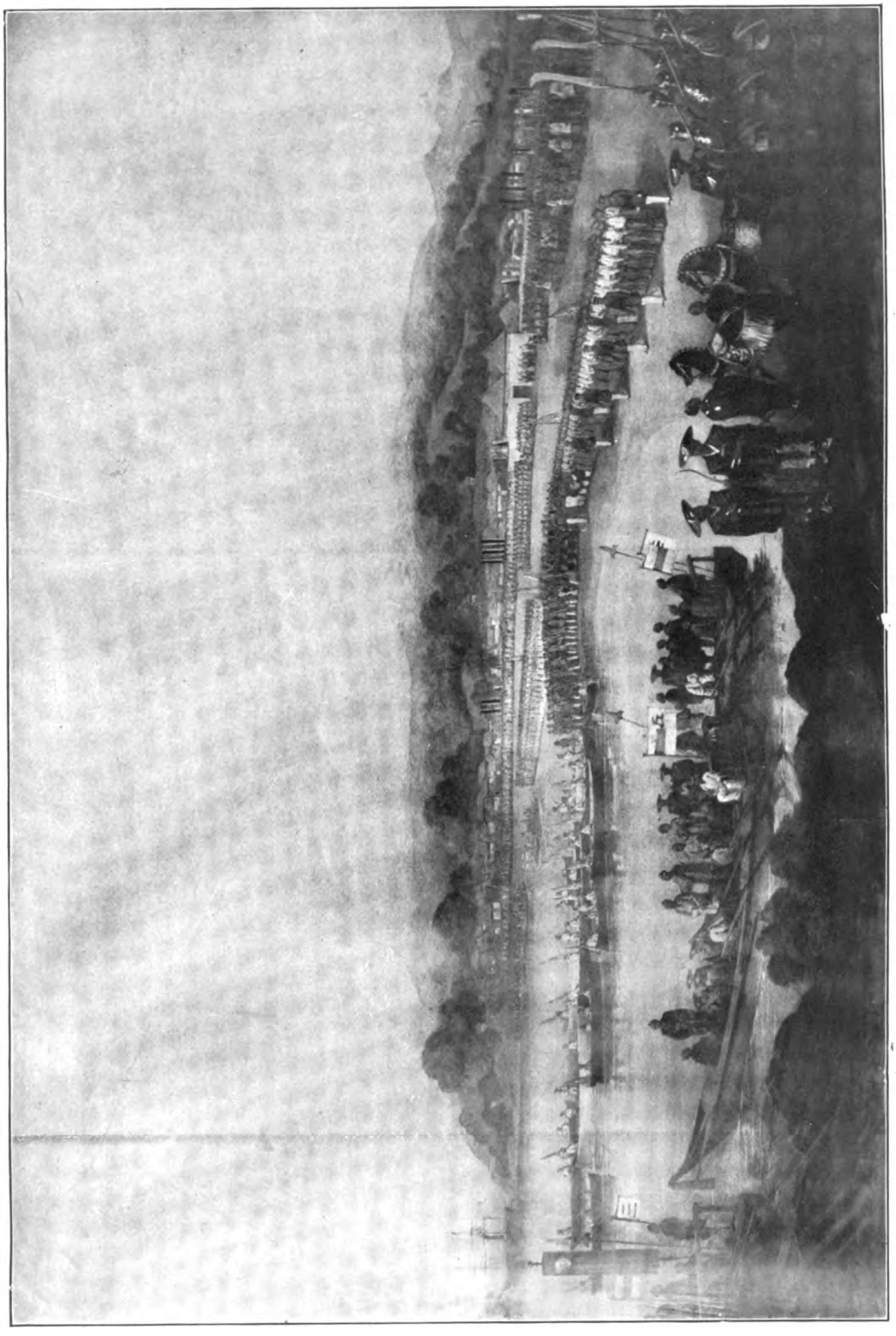
The Battles of Heikautai and of Mukden. — The Russian defeat at Liaoyang and the fall of Port Arthur made a great impression on European Russia. Russia, which had enjoyed the fame of being a great military power, must inflict at least one defeat on the Japanese in order to save her face. It was at this time that General Kuropatkin saw that the strength of the right wing of the Japanese Manchurian armies, which were stationed in the direction of Heikautai, was comparatively weak. Here was a chance to score a victory. So General Kuropatkin ordered General Gripenberg to cross the Hunho and commence forward operations against the right wing on 23 Jan. 1905. Lieutenant-General Tachimi, who was commanding the Japanese troops at Heikautai, confronted him and the battle was opened on the

26th. It was fought for three consecutive days and nights, and yet the fortune of war remained undecided. On the 29th all the Japanese regiments, determining either to drive off the Russians once for all or be annihilated in the attempt, made a most fierce attack, and despite great losses caused by machine-guns pushed forward and on the following morning at last succeeded in compelling the enemy to retreat.

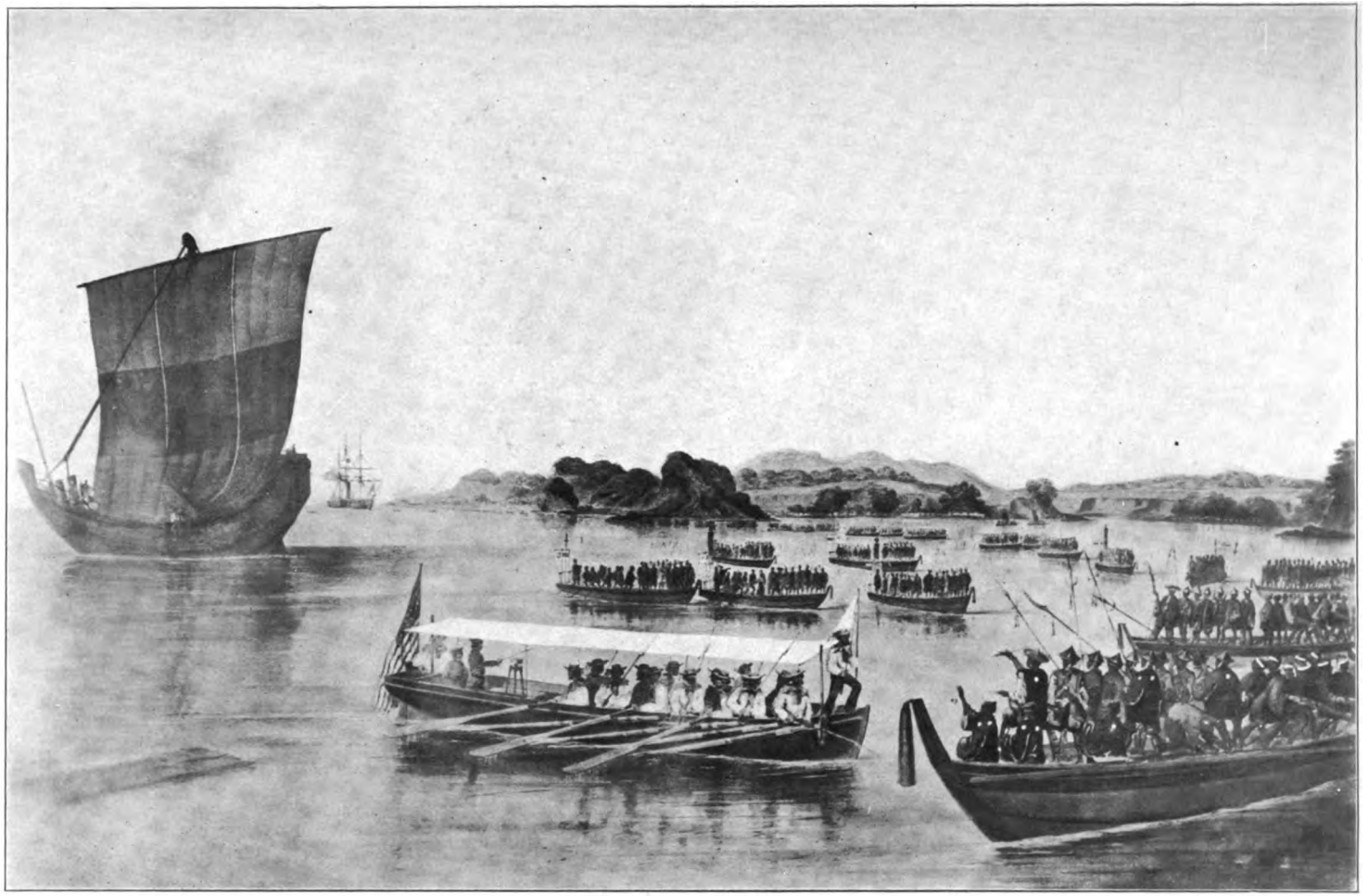
After the defeat at Liaoyang the Russians had been gradually concentrating their strength at Mukden, where they assidously prepared defense-works and attempted to check the advance of the Japanese toward the north. In the meantime the Japanese army was also greatly augmented, due to the joining of the Third Army after the capitulation of Port Arthur and that of the Yalu Army under the command of General Kawamura. Marshal Oyama now saw the opportune moment had arrived to take Mukden and ordered a general advance on the enemy's lines centring on Mukden. His general plan was: the central, left and right armies were to essay a frontal attack on the enemy by disposing themselves between Penhsiku in the east and the left bank of the Hunho in the west; the Third Army was to be in the left of the left wing and the Yalu Army in the right of the right wing, so that the one might be between the right bank of the Hunho and its left bank and strike at Mukden from the northwestern direction by taking a roundabout way, while the other might work in conjunction with the right wing from the direction of Hsingshing, attack the enemy in the direction of Hsingshing and capture at one blow both Mukden and Fushun. This plan was faithfully and excellently carried out. The memorable battle was opened 19 February. The extreme right wing of the Japanese armies pushed northward after occupying Chinghocheng, pressed on the left bank of the Hunho and, occupying the entire neighborhood of Fushun by 10 March, drove off the enemy in that region northward. The Russian casualties in this direction were not less than 20,000, while those of the Japanese were only some 3,800. As for the extreme left wing, it commenced operations on 27 February, and advancing from the west toward the northwest emerged in the rear of the enemy, and while the Japanese central, left and right armies were still confronting the Russians along the Shaho, was menacing Mukden itself with the railway line between it and the city. These prompt actions of the Japanese two extreme wings greatly contributed to victory, for the Russians, already hard pressed in front, were thrown into utter confusion, finding themselves attacked from the rear. By 11 March the Russians in the direction of the Shaho retreated to the right bank of the Hunho in disorder, and either by being hotly pursued or being surrounded, lost heavily. So great was the Russians' defeat indeed that in the direction of the Shaho their casualties were over 90,000. On the 15th Marshal Oyama made the formal entry into Mukden, and the office of the Tartar-General of the city was made the seat of his headquarters. The battle of Mukden was probably one of the greatest battles since history began, its battle line having extended to more than 125 miles, while the armies confronting each other numbered probably 450,000 on the Russian side and 350,000 on the Japanese side. After that battle the Japanese armies continued the pursuit of the retiring Russians, and Tiehling, Kaiyuan, Changtu and other places fell into their hands one after another.

The Battle of the Japan Sea.—When Port Arthur was completely isolated, Russia organized a second Pacific squadron with the purpose of relieving it. Led by Vice-Admiral Rojestvensky, it left Libau for the Far East on 16 Oct. 1904. The squadron was divided into two divisions, one of which voyaged round Africa, while the other passed through the Suez Canal. They joined again at Madagascar on the day on which Port Arthur capitulated. In April 1905 it stopped at different ports in French Annam, one after another, and on 5 May was joined by a third Pacific squadron commanded by Rear-Admiral Nebogatoff. As Port Arthur had already fallen, the Russian fleet steamed northward with the purpose of entering Vladivostock. Admiral Togo, commander-in-chief of the Japanese fleet, anticipated that the enemy's fleet would attempt the passage of the Straits of Tsushima, and calmly waited for its coming, having concentrated all his naval strength at the base of operations. At 5 A.M. on 27 May he received a wireless telegram saying that the enemy's fleet was sighted. He at once issued orders to different detachments of warships to sally forth and meet the enemy according to a prearranged plan. At 2 P.M. on the same day the opposing fleets confronted each other to the north of Okinoshima Island. Admiral Togo hoisted on the masthead of his flagship, *Mikasa*, a signal saying: "The fate of the Empire depends on the issue of this battle. All are expected to do their best." At 2.08 P.M. the enemy opened fire, but the Japanese fleet refrained from responding until the range became less than 6,000 metres. Then it opened fire. It was both fierce and effective, and in a short time, beginning with the *Oslabya*, which led the enemy's fleet, and the flagship, *Knias Suvaroff*, most of the Russian warships were either sunk or disabled, and when darkness set in the Japanese destroyers and torpedo-boats made daring attacks on the still remaining vessels of the enemy. On the following day the Japanese fleet succeeded in intercepting five Russian vessels, which were trying to escape northward. Rear-Admiral Nebogatoff, who commanded this detachment of the Russian fleet, saw the utter futility of resistance and surrendered. As for Vice-Admiral Rojestvensky, he was found on board a captured destroyer in a seriously wounded condition and made a prisoner of war. Of the 38 vessels which had attempted the passage of the Straits of Tsushima 20 were sunk and five were captured by the Japanese, and only four cruisers and a few destroyers and transports made good their escape. Thus it is no exaggeration to say that the Second and Third Russian Pacific squadrons were practically annihilated. In contrast to this overwhelming loss sustained by Russia the Japanese losses consisted of only three torpedo-boats.

Thus Russia lost on land Liaoyang, Port Arthur and Mukden, while on sea the First, Second and Third Pacific squadrons. The issue of the war was now clearly decided.



First Landing of Americans in Japan, July 14, 1853



SCENE ON THE BAY OF YEDDO, JULY 11, 1853

Lieutenant Bent in the "Mississippi's" Cutter Passing Through a Fleet of Japanese Boats

The North Korean Army.— For some time after the outbreak of the war Japan stationed only small garrisons at different places in Korea, but in view of frequent raids made by the Russians into the northern province of Hamgyong, headquarters of the Japanese troops in the peninsula were established at Seoul in the summer of 1905, with Lieutenant-General Miyoshi as commander-in-chief. The North Korean Army thus organized for the first time occupied the important town of Kyong-syong on 20 June and steadily advancing northward cleared the Pu-ryong and Pu-peuk districts of the enemy by 24 July, and occupying Kyong-heung, a town on the frontier of much strategical importance, was in a position to menace Vladivostock.

The Subjugation of Saghalien.— Not long after the battle of the Japan Sea a Saghalien expeditionary army was organized with military and naval contingents under the command of Lieutenant-General Haraguchi. On 4 July 1905 a squadron commanded by Vice-Admiral Kataoka left Otaru escorting a number of transports with troops on board. On 8 July the Japanese occupied Korsakoff without difficulty and advancing further north occupied Alexandrovski on the 24th, and on the 30th Lieutenant-General Haraguchi proclaimed military administration over the whole island. On the same day the Russian military governor of the island asked for an armistice, and on the following day the Japanese and Russian commissioners met to discuss the terms of surrender. The Russians agreed to Japan's terms, and 3,270 officers and men surrendered. In this way Saghalien was subjugated in three weeks.

Since the outbreak of the war Japan had won every battle on land and sea. Especially the great victories of the battles of Mukden and of the Japan Sea placed her in a most favorable condition as to the ultimate issue of the war. It was at this time that President Roosevelt of the United States urged the two combatants to lay down their arms. After duly considering different aspects of the situation, the Japanese government concluded that it was wise to listen to the friendly advice of President Roosevelt. On 3 July 1905 Baron Jutaro Komura, Minister for Foreign Affairs, and Mr. Kogoro Takahira, Japanese Minister at Washington, were appointed plenipotentiaries for negotiating the terms of peace with Russian plenipotentiaries (M. Witte and Baron Rosen). The peace conferences, held at Portsmouth, U. S. A., in the latter part of August, arrived at a satisfactory conclusion and the treaty was signed by the plenipotentiaries of both parties on 5 September. See PORTSMOUTH, TREATY OF.

TOKIWO YOKOI.

22. DIPLOMATIC RELATIONS WITH THE UNITED STATES.— Since the close of the 19th century, Japan, which was introduced to intercourse with the world by the tactful American expedition of 1853–54, and with which the United States has had recently more points of contact than with any other power except Great Britain, has occupied second place in American diplomatic relations. The earlier importance of friendly relations with Japan, which was first visited by an American vessel (the *Eliza* of New York) at the port of Nagasaki in 1797 and again in 1803 in unsuccessful attempts to open trade, was greatly increased by the American discovery of valuable whale fisheries near the Kurile Islands, followed by the imprisonment of ship-wrecked American seamen on the Japanese coasts from which foreigners were excluded by a hermit policy. The importance of closer relations was especially emphasized more strongly by the negotiation of a treaty with China in 1844 and the acquisition of California in 1848, resulting in plans (by 1851) for a trans-Pacific line of steamers. The earliest plans to open trade by an expedition under government auspices, first proposed by Captain Porter in 1815, were never executed. In 1832 President Jackson, recognizing the need of ports in the Far East, sent Edmund Roberts as a confidential agent to several countries of that region, including Japan, with instructions to negotiate treaties to secure the safety of seamen and commerce, but Roberts did not proceed beyond Cochin China. Later hopes of an opportunity to find a way for the beginning of friendly relations were disappointed by the failure of friendly private attempts to return some shipwrecked Japanese in 1837, and again in 1845, and by the later unsuccessful efforts at peaceful negotiations to open trade relations through Commodore Biddle of the American Navy Department in 1846.

In the growing trade with China after 1844, the superiority attained by American "clipper" ships by 1845, the development of American interests on the Pacific Coast after 1848, and the increasing importance of accessible harbors for supplies and refuge for American trading and whaling vessels, the American government found new subjects for diplomatic efforts in the Pacific and good reasons for urging the opening of intercourse with Japan. Its purpose after 1848 to guard more vigilantly American interest in the Pacific was indicated by negotiation of the first treaty with Hawaii in 1849 and also a treaty with the Sultan of Bruni in Borneo in 1850; and its determination incidently to resist more strenuously the Japanese policy of strict Oriental isolation and exclusiveness which provoked American enterprise (elsewhere so successful in mastering opposition) was illustrated in 1849 by the peremptory demand of Commander Glynn for the immediate release of 16 American prisoners — a demand to which the Japanese officials acceded after failure to evade it by successive strategic manœuvres, first by threats of offensive operations, then by haughty indifference and finally by evasive diplomacy. In 1851, the American government, influenced by Glynn's enthusiastic suggestions and proposals for conversion of the Japanese policy, decided upon another friendly appeal for access and supplies for trading vessels, through instructions to Commodore Aulick whose powers were transferred (in November 1852) to Commodore M. C. Perry.

Without use of force, but by exhibition of American power through ships and inventions, Perry in March 1854 negotiated the first treaty of Japan with a western power — a treaty which, regarded as a marked American success, provided for peace, amity, trade and supplies at the ports of Shimoda and Hakodate, protection to shipwrecked sailors and ships in distress, consular residence at Shimoda, and most-favored-nation treatment. From the expedition and the treaty Japan dates its new birth —

a fact recently recognized by the erection of a monument to Perry in 1901. For over half a century, with only a brief exception, relations continued mutually friendly.

Townsend Harris, who was commissioned consul general in September 1855 and established his residence on the Bay of Yedo at Shimoda which had been opened to American commerce by Perry's treaty, soon found that the opening to foreigners, accepted as inevitable by the government, was resisted by the people who were unwilling to receive the "western barbarians." In the disorder which resulted in the period of readjustment, while other nations held the weak and tottering Japanese government to the strictest accountability, he refused to sanction harsh and oppressive measures. But, though interested in Japanese welfare and opposed to taking any unfair advantage of Japanese ignorance of international relations, he firmly and skillfully ripped open the laminated deception of the Japanese diplomatists and succeeded in obtaining all the concessions which became the basis of new treaties negotiated at Yedo in the American spirit of justice and tolerance — treaties which secured commercial rights and laid the foundations of diplomatic intercourse. By a treaty negotiated 17 June 1857 he secured rights of permanent residence at the two open ports, the opening of an additional port at Nagasake, residence of a vice-consul at Hakodate, and extraterritoriality. On 29 July 1858, having secured right of audience, he negotiated the third important American treaty providing for mutual diplomatic representation at the national capitals, three new ports, extension of the jurisdiction of consular courts, full religious freedom and privileges to Americans, and regulation of customs (subject to revision after five years if desired by Japan). Ratifications were exchanged at Washington with appropriate ceremonies in 1860 by a special Japanese embassy which aroused public interest. In recognition of his services, in January 1859 Mr. Harris was commissioned minister resident, a position which he held until April 1862.

The American policy of separate action and respect for Japanese sovereignty — a policy consistently maintained except in emergencies created for a brief period by Japanese foreign agitation and internal disorders — increased Japanese confidence and facilitated diplomatic relations.

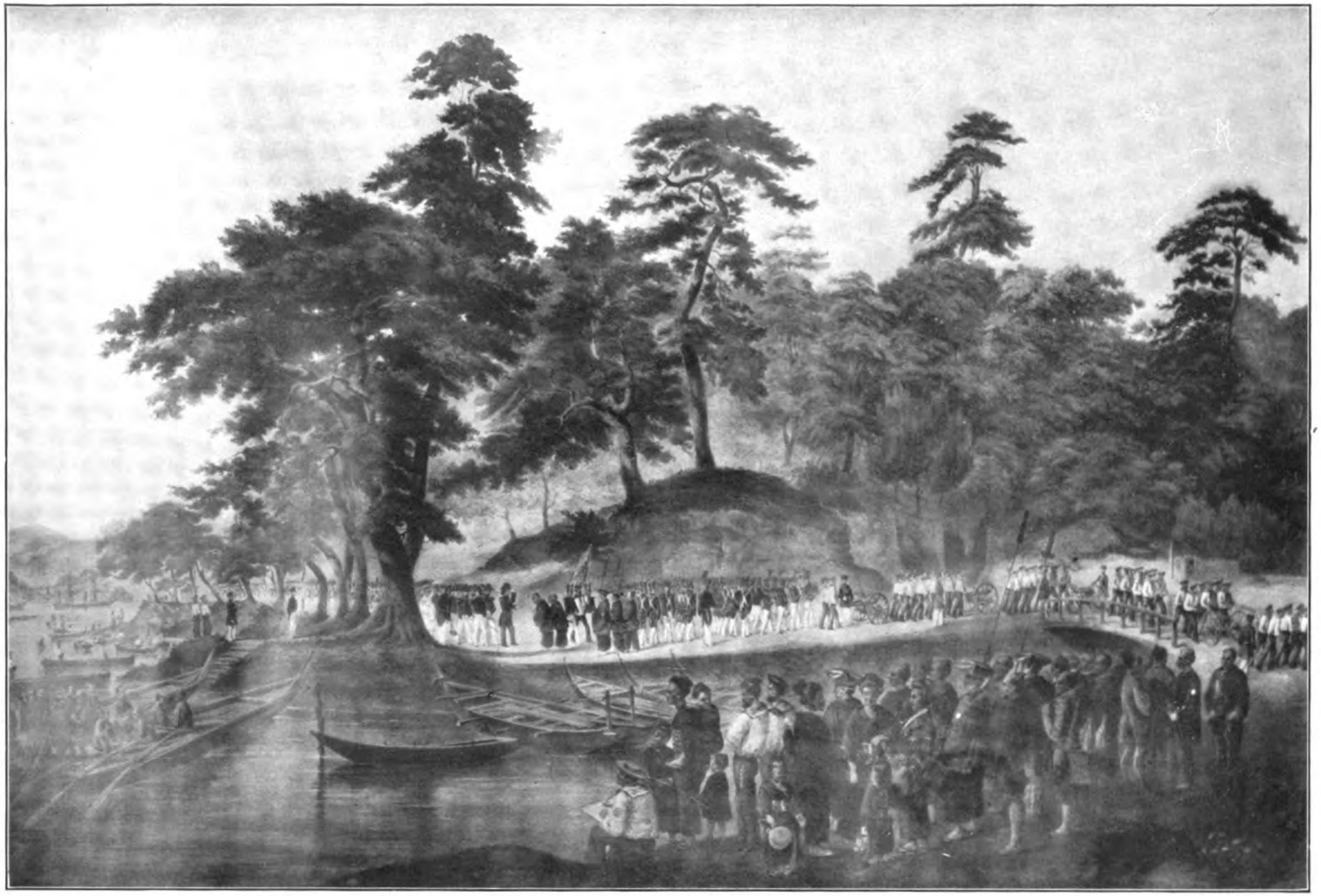
Unfortunately Japan, under the influences of the misfortunes which had overwhelmed China, and against the prudent policy counselled by the American representative, sought to temporize in the face of apprehended dangers, but gradually yielded to foreign demands. Thus it was forced to grant extraterritoriality, under which foreign consuls set up miniature courts involving the unfortunate natives in technical violations of their edicts, and to submit to foreign demands for tariff concessions, for various exemptions (from land taxes, tonnage and lighthouse dues, and bridge tolls) and for monopoly of coastwise trade. The tariff concessions later involved the country in financial distress, resulting from the burden of taxes on agricultural interests which produced detestation for the government and disdain for foreigners.

Even while Harris was serving as American minister conservative opposition to the treaty concessions produced an anti-foreign agitation, incidentally resulting in the assassination of Harris' secretary, the burning of the American legation and the compulsory withdrawal of American representatives from Yedo.

After 1863, as a result of the necessity of chastening the reactionary feudatory Japanese prince of Choshiu who in defiance of the Tycoon had closed the Shimonoseki straits, the American government adopted a new rule of practice in regard to international relations. Harris' successor, R. H. Pruyn, in concert with representatives of other governments demanded the observance of treaties and in January 1864 negotiated a treaty reducing duties. In his period as minister, occurred the revolt against the Shogun, who represented the legal government. It culminated in the attempt by the rebellious daimio of Nogato to close the straits of Shimonoseki, an act which resulted in an expedition of allied fleets in which vessels of the United States participated. Following the action of the reactionary lord of Choshiu in firing on American and other foreign ships in Shimonoseki Strait, the United States government acted in connection with governments of other powers (Great Britain, France and the Netherlands) in bombarding Shimonoseki forts and in exacting indemnity (1864), in securing at Osaka (in November 1865) the Imperial section to the existing treaties, and in negotiating a concerted international treaty (of June 1866) securing more liberal trade privileges and a regulation limiting duties at 5 per cent during the pleasure of the treaty powers but providing for revision within a specified time by concert of the powers — a regulation which proved burdensome to Japan. Religious toleration largely secured through the firmness of the American minister Van Valkenburg and his successors between 1868 and 1874 was later sanctioned by the Constitution of 1889.

Following the revolution which resulted in the establishment of the emperor's government at Tokio, Japan made unsuccessful efforts to negotiate for a reconsideration and revision of burdensome treaty relations with a view to securing autonomy, to take effect after 1872. These efforts were made, first through the foreign ministers at Tokio, and later (1871–72) through a Japanese embassy of five eminent men which was sent to visit foreign capitals but found no hope of concessions except at Washington. Then, encouraged especially by the friendly liberal spirit of the United States, the awakened nation began the task of reaching a high national standard which would be recognized by the treaty powers. The first step was taken by increasing the number of young Japanese students sent abroad for education, and by increasing travel abroad by Japanese of maturity to observe the ways of the western world. The progressive results appeared in the establishment of a system of diplomatic receptions at Tokio in 1872, the adoption of the Gregorian calendar in 1872, the creation of provincial assemblies in 1875, followed in rapid succession by codes of laws, compulsory universal education, a constitution, and a national parliament.

Meantime several incidents indicated the growth of mutual confidence and friendship between the United States and Japan. In



COMMODORE PERRY MEETING THE IMPERIAL COMMISSIONERS OF JAPAN, JUNE 8, 1854

undertaking the annexation of the Lu Chu Islands in 1872, Japan recognized the Perry Treaty with the islands which had been proclaimed by the American government in 1855. An interesting question of jurisdiction over the Bonin Islands on which Americans had established a small colony in 1832, and over part of which Commodore Perry had established a claim by occupation in the name of the United States in 1853, was satisfactorily settled in 1873 by the decision of the American government (Secretary Fish) not to support a claim which had no sanction of the American congress. In the postal convention of 1873, the United States again manifested confidence, and recognized Japan's ability and right, by surrendering to the Japanese government the control of its mail system. In 1883 the American government gave another evidence of good will and sense of justice in the courteous return to Japan of the American portion of the Shimonoseki indemnity of 1863, whose remission had been sought by Japan in 1874, and at least two-thirds of which was popularly regarded as shameless extortion. It also gave another evidence of fairness by an apology for the action of Commander Selfridge who violated the sovereignty of Japan by firing at a target on Japanese shores.

With each new progressive step the Japanese government increasingly felt the irksomeness of the disabilities imposed by treaties which could be terminated only by concerted consent of all the treaty powers. The question of the revision and reformation of her treaties with foreign powers overshadowed all others.

The American government, which, although it had recognized the earlier need of unity of policy by the treaty powers, had never fully approved the continuation of the treaty provisions for extraterritoriality and tariff restrictions, sympathized with the long continued efforts for treaty revisions so much desired by Japan to remove a badge of inferiority which earlier necessary treaty arrangements had imposed and was the first foreign power to favor revision. In 1875 it adopted an independent course by negotiating a treaty conceding customs autonomy and the right to regulate the coasting trade, but not operative until Japan could induce other treaty powers to negotiate similar treaties. Following this treaty the Japanese in 1879 demonstrated their high regard for America by the friendly welcome and reception by government and people to ex-President Grant, who visited Japan in that year and was entertained in regal state at one of the Emperor's private palaces at Tokio.

Efforts, failing to obtain concessions from the other powers, unsuccessfully renewed in 1882, began to make some progress in a joint diplomatic conference at Tokio in 1886–87, but not enough to satisfy Japan. Meantime, beginning in 1879, the United States faithfully obeyed Japan's quarantine regulations which were ignored by other powers. In 1880, it negotiated a convention for reimbursing shipwreck expenses and in 1886, following a voluntary act of international comity by the Japanese government in the arrest and surrender of an American criminal who had sought asylum in Japan, it negotiated with Japan an extradition treaty which gave support to Japan's efforts toward judicial autonomy and complete sovereignty.

Finally through the amazing results of a war, which arose in 1894 against China concerning the control of Korea, Japan won the recognition of her rights as a world power — promptly accorded in a treaty with Great Britain — which, then diplomatically isolated from the other European powers, promptly sought an alliance to protect interests of the Far East from possible result of an alliance of Russia, Germany and France. Following the completion of the British treaty, the United States in 1894 quickly ratified and proclaimed a treaty, effective in 1899, setting an example for the prompt action of the other powers and resulting in a general agreement, effective in 1899, terminating extraterritoriality and providing for realization of complete tariff autonomy by 1911, thus recognizing Japan as a peer among the great powers — the final step of a series in which the United States had always taken the initiative.

The recognition of the accomplished modernity of Japan was followed by new diplomatic evidence of friendliness, and by an increase of pleasant social relations resulting from increase of travel and trade, and marred only occasionally by discord or dissatisfaction. In 1897, at the invitation of the American government, Japan and Russia agreed to send delegates to meet those of the United States at an international conference with a view to the protection of the fur seals of the North Pacific which, under existing regulations, were threatened with extinction. The conference drafted and signed a treaty which was made operative conditional upon adhesion of Great Britain. The regulation of the industry was finally made effective by the negotiation of a treaty of 1911 to which Great Britain was also a party. In 1898, when the United States annexed Hawaii to which there had recently been an influx of surplus Japanese population, the Japanese government, apprehensive that the act would disturb the balance of power in the Pacific, and might jeopardize the rights of Japanese citizens residing in Hawaii, expressed its disappointment in a surprising formal protest which, however. was soon withdrawn. It made no protest against the American annexation of the Philippines, and it supported the American principle of the "open door" and territorial integrity in China — as the United States supported the Japanese efforts to secure a permanent establishment in Manchuria. Late in 1899, it gave a favorable answer in favor of a cable which would bind Japan more closely to the United States. The well-known Anglo-Japanese treaty of alliance of 1902, twice renewed with amendments in 1905 and 1911, and profoundly affecting the situation in the Far East, was not regarded as unfriendly to the United States. In the Russo-Japanese War of 1904–05, following a complicated and elusive negotiation in regard to Manchuria, whose evacuation by Russia was urged by the United States and demanded by Japan, the United States maintained its neutrality and American representatives were placed in charge of Japanese interests in Russia. In June, 1905, the war was terminated by peace negotiations, proposed to Russia through the good offices of President Roosevelt at the suggestion of Japan, and conducted at Portsmouth, New Hampshire. The terms of the treaty were probably as satisfactory as Japan could have expected. Following

the period of hostilities between Japan and Russia, Secretary Taft and party, briefly stopping in Japan received an extraordinary ovation. America, although it could have interfered under treaty provision to maintain the independence of Korea, ignored the private appeals of the Korean emperor, and placed no obstacle to Japan's domination there. In 1906 both countries raised their legation to embassies. In 1908 by an exchange of notes they committed themselves to a policy of existing *status quo* in the Pacific and China and to the principle of equal opportunity of communication and industry in China.

In the period from 1897 to 1908, treaties were negotiated providing for extension of extradition (1906), for protection of patents (1897), and copyrights (1905 and 1908), and for arbitration of legal and treaty differences (1908, renewed in 1913).

Meantime, however, the character of relations was radically changed by events of the decade before 1908. After 1906, friction and strained relations were threatened by two groups of questions: (1) those relating to Japanese emigration to America, and anti-Japanese agitation or legislation on the Pacific coast; and (2) those relating to American-Japanese rivalry in Asia and the Pacific (including the coasts of Latin America). An anti-Japanese movement in California, originating in economic and social differences and becoming more pronounced by the rapid increase of Japanese immigration after 1906, culminated in a violent agitation (in 1906-07) for exclusion of Japanese laborers under a regulating clause of the treaty of 1894, and placed the Washington government in a very uncomfortable situation. A crisis was averted (in 1907-08) through exchange of notes resulting in an agreement for restricting through the Japanese passport system the emigration of Japanese to the United States.

Closely related to this agitation, and even a more dangerous element in threatening a diplomatic crisis was the ordinance of the San Francisco Board of Education, issued in the autumn of 1906, requiring segregation of Japanese, Chinese and Korean children in an Oriental school. This measure was later essentially modified through the influence of President Roosevelt who disapproved it and co-operated with the Japanese government in reducing the agitation by the friendly informal understanding of 1907-08 under which Japan undertook, by refusing passports, to restrict emigration of laborers to the United States — thus meeting the California demand and at the same time saving Japanese pride.

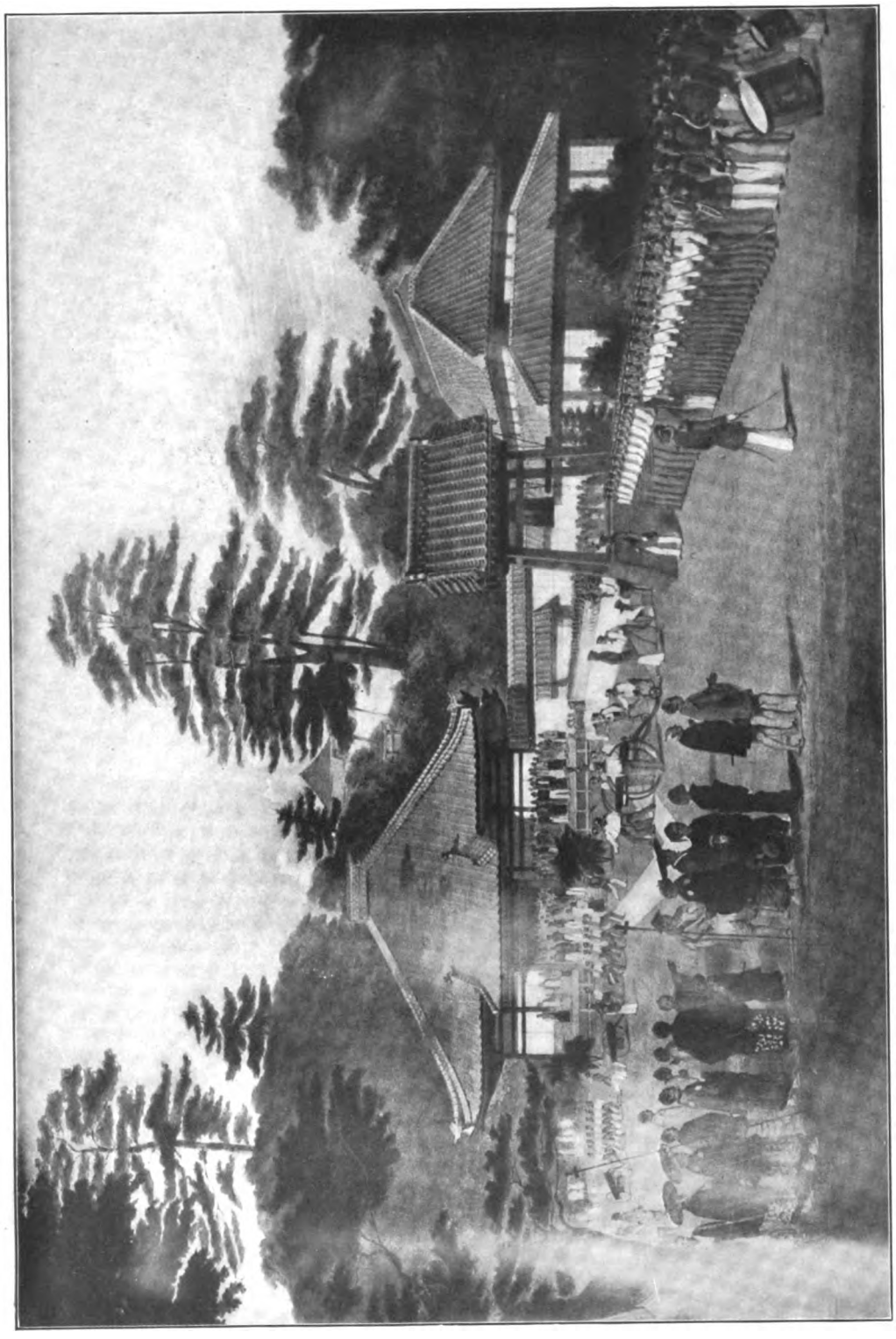
In 1907 the President under authority of the Immigration Act of that year, excluded from continental territory of the United States, persons having passports for American insular possession, for the canal zone, or for other countries. In a new treaty of 1911, supplementing that of 1894 and omitting the clause in regard to the regulation of immigration of laborers, Japan agreed to maintain the limitation of emigration of laborers as exercised in the preceding three years.

Relations were again strained in 1913 by proposed legislation in California for preventing certain classes of aliens from holding lands in the State. The legislation as passed was materially modified by permitting agricultural leases — following a conference of the Governor with Secretary Bryan who was sent to California by President Wilson to present views on the international question involved and the Washington government maintained that as modified, although it reflected local economic competition, it preserved all rights under the treaty of 1911; but it was still regarded by Japan as an act involving unjust racial discrimination.

Perhaps the crux of the Japanese question in the United States is naturalization — to prevent discrimination. The question of the position of Japanese already lawfully residing in the United States — an issue distinct from immigration — has proved most perplexing. Although, under treaties they have had the rights of citizens of the most favored nation, they have been ineligible to citizenship and, beyond rights protected by treaty, have been at the mercy of unfriendly legislatures restricting their privileges. With a view to settlement of the question, in December 1906, President Roosevelt recommended to Congress the enactment of a law specifically providing for naturalization of resident Japanese who might desire American citizenship; but the time was inauspicious for consideration of the question. Rightly or wrongly, Japan thinks that inasmuch as she has shown herself conciliatory and accommodating in the matter of immigration, "it should be the duty of the authorities and leaders at Washington to make honest efforts to extend citizenship to the Japanese now here and thus shield them from the whimsical legislation of the various States" which if not curbed may eventually produce a most critical situation.

The character of relations has also been changed by the development of many new points of contact since 1898, and especially since 1905. Relations were especially affected by the completion of the Isthmian Canal which placed the United States nearer than Japan to the western coasts of Mexico and South America, and closer to Japanese doctrine in regard to the control of Asia. The overflow of surplus landless Japanese population, which after 1905 found an outlet in Korea, has started a migratory movement across the Pacific to undeveloped Latin America — especially to Mexico, also to Peru and Chile, and even to Brazil — which will doubtless increase greatly in volume, and may in time provoke agitation and alarm among the native populations, and possibly result in conditions inducing the Japanese government to threaten the use of force to protect its subjects, and thus compel the Latin American governments to appeal to the United States for protection under the Monroe doctrine. In 1912, apprehension of Japanese plans to purchase Magdalina Bay on Mexican territory of Lower California for a harbor and a Japanese colony caused the proposal of a new corollary of the Monroe doctrine known as the Lodge resolution, which passed the Senate by a vote of 51 to 4 but was not accepted by President Taft.

Restriction on Japanese emigration to the western coast of the Pacific will impel them toward the islands and coasts of the Far East. Their desire for islands was indicated by their recent demand (in November 1918) for reten-



American Sailors in the Temple Grounds, Simoda, July 8, 1854

1 Group of Figures at the Annual Celebration of the Worship of the Dead
2 Altar at the Ceremonial of the Worship of the Dead

tion of the Caroline, Ladrone and Marshall groups, in which they supplanted Germany at the opening of the recent World War. Toward Hawaii, in which there is a large Japanese population, Japanese jingoes, disappointed by the American annexation of 1898, still entertain ambitions not reconcilable with American interests — although there is no evidence that their irrepressible chauvinism is shared by responsible statesmen at Tokio. Toward the nearer but tropical, thickly settled Philippines, in which there is no large Japanese population, but a discordant population possibly of distant kin, Japanese imperialists and ardent expansionists after the close of the Russo-Japanese war turned their awakened thought in favor of tropical colonies, and perhaps they may be the advance guard of future Japanese policy on a question possibly not yet completely settled in American policy. Probably Japan does not at present covet the Philippines, but wants there only economic privileges such as she has enjoyed equally with all nations.

Toward China, concerning which before 1905 there was complete harmony of American-Japanese interests and policy, Japanese policy since 1905 has changed, in accord with a claim of "natural liberators and protectors of China from servitude to Europeans," and as a result of increasing American-Japanese commercial competition in the Pacific and Far East. After the close of the war against Russia, fought single-handed, and professedly in support of an open door policy, Japan, confronted by a resumption of the Russia policy of encroachment on China, fearing the failure of any further contest to secure more decisive results, and especially apprehensive of German designs, surprised the United States and the world by negotiating a friendly agreement of alliance with Russia in 1916 as a means of security in the development of Japanese enterprise in Manchuria. By this significant convention each party agreed not to "become a party to any arrangement or political combination" directed against the other, and to "act in concert on the measures to be taken" in case of menace to the territorial rights or special interests of either in the Far East.

Japanese statesmen claim that the "guiding factor" of the foreign policy of Japan — a country over crowded and endowed with scant resources — is the "instinct of self-preservation," directed against menaces both from within and from without, and primarily expressed in plans for the solution of the Chinese question ("the molding of Asia's destiny") but also in plans for conversion into a great commercial nation.

In the recent controversies between Japan and China, the United States did not become directly involved. Following the Japanese demands on China, which were granted in large part by the China-Japanese treaty of 25 May 1915, the American government announced that it could not agree to any action which might impair American-Chinese treaty obligations, or the open door, or Chinese integrity. In 1917 it reached an agreement with Japan on questions relating to Japanese policy in China. Late in August 1917 a special Japanese mission armed with full power, headed by Viscount Kikujire Ishii arrived at San Francisco en route to Washington to secure better understanding between the two countries, and to silence mischievous reports By an agreement of 2 November between Secretary Lansing and Viscount Ishii, the United States government, consistent with the principle of the Monroe doctrine, recognized that Japan by territorial propinquity had special interests in China, and obtained from Japan a recognition of the principle of the open door and a denial of any purpose to infringe in any way on the independence or territorial integrity of China. Although the recognition of special Japanese interests conceded no right or authority over the destinies of the Chinese peoples and was joined with the guarantee of China's independence and integrity, and although the pact was justified by China's feeble condition as a sovereign state, the Chinese government made a formal protest stating that it "will not allow itself to be bound by any agreement entered into by other nations" in which it had no part. The Chinese were too much engrossed in civil strife to see that the American recognition of Japanese special interests was really a recognition of an Asiatic Monroe doctrine — an American recognition of a real Japanese analogue to the Monroe doctrine.

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23. JAPAN IN THE WORLD WAR. When in 1859 Japan emerged from her long isolation into international interests and affairs and became a trading nation, she made it her policy to keep open the paths of communication with Europe. It was with this idea that, immediately after the war in 1905, she sought peace and cooperation with Russia. One visible demonstration of this desire is seen in the erection, by the two nations, of a handsome memorial at Port Arthur, in honor of the victims of the siege, both Muscovite and Japanese. Furthermore, several treaties, amounting almost to an alliance, offensive and defensive, were made between 1905 and 1914. Envoys of either country, visiting the capital of the other, were received with marked demonstrations of joy. Strenuous efforts were made in Japan to bend all energies to developing the resources of the empire, during the era of peace which was now expected to endure for a generation, at least. The invasion, in 1907, of Shantung province and the erection of a German colony and naval station with fortress, garrison and railway penetration into the

interior of China, on which $100,000,000 have been spent, seemed to menace these plans. Yet few suspected at that time that this occupation would so soon breed complications. Like a sudden growl of thunder, while the sky was blue, portending a storm, came the news, in July 1914, of impending hostilities in Europe. As soon as war was declared by Germany against Great Britain, the ambassadors of the Entente Allied belligerents, then in Tokio, met to confer concerning the part, and the sphere, of Japan's operations in the war. In compliance with the terms of Article II of the Anglo-Japanese Alliance renewed in July 1911, Japan was ready. By exchange of notes between Tokio and London, it was agreed that Japan should take charge of naval matters in the eastern seas and make conquest of the German colonies in the Far East and the Pacific Ocean — the question of ultimate possession being left to the congress of nations after the war. According to Article XIII of the Constitution of 1889, "the emperor declares war, makes peace and concludes treaties," on 23 August Japan declared war against Germany. It was not expected that she would send an army to Europe, but she must eliminate Germany from eastern Asia and the Pacific islands. Virtually the whole guardianship of the area east of the Atlantic Ocean was put under her care, so that every available vessel owned by the Entente Allies, armed or unarmed, might be released for activities in western waters. The Red Cross Society of Japan acted with promptness, and dispatched three relief corps of trained men and women, with remedies and surgical equipment; the staff for England being 20, for France, 29, and for Russia, 13, these numbers being increased later.

The outbreak of the European War, in which Japan and Russia were now Allies, was the signal for intense activities, carried on night and day, in the arsenals and factories of Osaka and other cities. Artillery and munitions, especially shrapnel shells, over a million rifles, boots, shoes, clothing and most of the requisites of an army in the field were made during the war and dispatched, by way of Vladivostok, to the front. It was these supplies that enabled the Russians to win signal advantages over the Germans, just when the Allies were hard pressed at Verdun and along the western front.

The detailed program of co-operation between Japan and the Entente Allies looked to the reduction of the strong German fortress at Tsingtau in China, the possession and occupation of all German colonies in the Pacific, the clearing of the seas of German commerce-raiders, the convoying of French transports from China (with laborers) and Annam (with soldiers), and the British and colonial ships, with troops from Australia, New Zealand and South Africa, and the sending of a fleet of destroyers to the Mediterranean. The successful execution of this plan resulted in the uninterrupted dispatch of reinforcements to the western front, the freedom of commerce, assistance in putting down a mutiny at Singapore, and the release of nearly the whole of the Siberian army to aid the Russians in Europe on the western front. The dispatch of three divisions, with the blockading fleet (20,000 men with 162 guns) under General Kamio, to Tsingtau, compelled the surrender of that fortress on 7 Nov. 1914, and the occupation of the German area in China, with a garrisoning force, was made under General Otani. One by one the German colonies in the Pacific were taken over by Japan and the seas cleared of raiders. The torpedoing of a Japanese destroyer in the Mediterranean and the landing of 80 corpses at Yokosha, for cremation, brought home the realities of war on the waters. The casualties suffered by the Japanese, down to 1 September 1915 totaled 3,000. One effect of the war, following rapidly, was the creation of a vast system of shipbuilding, which brought so great and sudden influx of wealth to Japan as to disturb seriously the social equilibrium and raise up a class of millionaires, who seemed to have the worst traits of the vulgar new rich. With the distribution of this world's goods so uneven and the pernicious activities of speculators in food continuing, in spite of government's warning and a large importation of foreign rice, nation-wide food riots occurred in August 1918, on the very eve of the departure of the army of intervention. The upset of old conditions in Russia, first by the revolution and then by the Bolsheviki, caused the accumulation at Vladivostok, over acres of area, of stores imported from Japan which it would require months to remove. To protect these stores from loot and deterioration the Japanese government ordered a small guard of marines to be landed. When, amid the turbulence in Siberia, several Japanese lost their lives the popular wrath at home flamed out. Hitherto it was the government rather than the people of Japan that was actively interested in the "white man's war." It was difficult for the average Japanese to see why the nations that had persistently refused admission of his countrymen to either their home lands or their colonies, should ask help from Japan. Why must Japanese make sacrifices to support a war in remote regions when taxes were already so onerous and the standard of life was kept low by military and naval burdens just when new wants were felt and fresh ambitions were awakening? With less than a score of submarines, very few aeroplanes and much of her armament made obsolete by the new applications of science, Japan could not, even if finances permitted and she was especially invited, send a large force to the western or other fronts, and Russia never called for aid in war. When, however, under the Bolsheviki régime, virtual anarchy in Siberia and the release of 300,000 German prisoners presented a menace that was nigh at hand, as well as of world import, both people and government in Japan were one in zealous readiness for co-operation and intervention by the Allies in Siberia. After assurances given that Japan sought no territorial advantage, desired to keep friendship with the Russian people, and would abide by the ultimate decision of the Allies, three divisions were at once dispatched by way of Vladivostok, Korea and Manchuria under General K. Otani. Junction was promptly made with the Czecko-Slovaks, the Americans and other allied contingents. The United States Ambassador, Roland S. Morris, followed and held conferences with the heads of the provisional governments arrayed against the Bolsheviki. The new cabinet in Tokio, under Kei Hara, premier, laying stress on friendship with Russia, disclaimed any idea of intervening in

the domestic situation. Otani landed 19 August, fought a battle on 24 August, and by 5 Sept. 1918 had moved his army 420 miles and captured Khabaravosk. By 12 September the allied forces entered Blagiovestchensk, capital of the Amur province. Chief of Staff Uyehara of Tokio, having telegraphed thanks and compliments to the American Colonel Morrow, the latter praised General Otani, declaring that "the union of the Japanese and American armies will still more closely unite the friendly nations." By 22 September the Japanese cavalry, having overcome the enemies' resistance, took possession of Rufulor and other points 300 miles farther. Consult Jones, 'The Fall of Tsingtau' (1915); Coleman, 'Japan or Germany' (1918); Ozak, 'The Voice of Japanese Democracy' (1918).

WILLIAM ELLIOT GRIFFIS,
Author of 'The Mikado's Empire.'

JAPANESE CERAMICS. The ancient Kameoka ware of Japan Brinkley considers as pottery of the aborigines who were displaced by the early invaders who conquered and settled in Japan. The ware is too crude to describe; the same may be said of ware (found in graves) made by the early Mongol invaders. Gyogi-yaki (*yaki* is the Japanese equivalent to our word *ware*) pieces are found in Japanese temples and are highly reverenced as the production in the 8th century of potters working under the tuition of the Korean Buddhist priest Gyogi; they are glazeless pieces in dark clay lacking any art merit. Kato Shirozaemon, a Japanese called generally Toshiro, gained years of experience in Chinese potteries and established in Seto (about 1230) his kiln, called Heishi-Gama, where he made dainty little tea jars of fine close paste and lustrous glaze, the body being purple, light red, dark red, gray, etc. The Japanese prize these pieces above everything and pay unlimited prices for them, preserving them in costly lacquer boxes, etc., and term them Ko-Seto (old Seto). Pottery production was continued by four generations descendant from Toshiro, their wares being respectively known as Ki-Seto-yaki, Chu-Kobutsu or Kinka-zan and Hafu-gama. These pieces (many extant) are all tea-ceremony (Cha-no-yu) articles. Gorodayu Goshonzui, a Japanese potter, went to the great Ching-tehên Chinese potteries and brought back (1510 or 1513) much knowledge of producing underglaze porcelain decoration, and settled in Hizen (probably Arita) where he made porcelain wares after Chinese models and in Chinese clay imported by him. The work stopped when the supply ran out; he used the famous "Mohammedan" blue (see CHINESE CERAMICS) on tea jars, water vessels, censers, cups (for the *matcha* ceremony) in "hawthorn" and other floral decoration, also "conventional children" in arabesques. Ware shows beautiful glaze. Soshiro, at Fushimi, made rich white or buff-colored incense burners and tea jars late in the 16th century. They are of polished biscuit (unglazed) with designs in red, gold or black lacquers. Korean potters settled in the port of Karatsu (or Negoya) on the Hizen coast in the 11th century, but the *Oku-gorai* pieces claimed as theirs by native connoisseurs, though crude, are later Karatsu-yaki, or perhaps Korean. They are of coarsely crackled patchy brown body. Korean style stone-ware (*E-Gorai*) was made here in the 12th century in gray or brown ware. The 12th century Karatsu rice measuring bowls (*Yoni-hakari*) still exist. All pieces up to the 13th century were fired inverted, and show the "spur" marks from the oven supports, and have no glaze on rims, but thin glaze on bottom; which condition is reversed in the following centuries and the spur marks disappear. Korean potters in the 16th century settled in Karatsu and produced Chosen Karatsu-yaki in hard, coarse paste with dark red and cream-colored glazes. *Flambé* (mottled) glazes appear middle of the 17th century. In the 18th century a special ware for the Shogun's court, termed Kanjo-garatsu, was made. It consisted of cups, tea jars, etc., with simple incised decoration filled in with white clay and having a darkish green glaze. But another ware under this name is stone-ware with white or gray glaze. In 1525 the Korean potter Ameya came to Kioto; he called his archaic ware So-kei-yaki. His widow's ware (*Ama yaki*) was an improvement, but his son, Chojiro, became famous through his tea-ceremony pieces. The Teiko (ruler) presented him with a seal having the ideograph *Raku* on it, and the ware became the greatly prized Raku-yaki of the tea-ceremonies. His descendants run kilns to this day. The term *raku* has ever since stood to represent a thick ware of coarse clay and thick lustrous glaze such as those of Tatsumon, Tokio, Banko, Bizen, Kioto (Awata), Shigaraki, Osaka, Ohi, etc.

Satsuma-Yaki is a faience of several varieties and localities as well as periods; the "Gohonde" Yoshiro-stamped product alone is of eight styles (according to color and appearance of glaze), and the Kumagawa finely crackled brown paste, buff-glazed ware is another held in great esteem by Japanese connoisseurs; it originated the ware that later became world famous. The Hibiki-de (white crackled) faience was first made (1650) at Tatsumonji, and the Japanese treasure pieces in Tangen's (court painter) decoration. Some old crackle Satsuma faience is in apple-green or yellow monochrome. Old Satsuma aimed at producing a surface exactly like ivory, and succeeded; 18th century enamel-decorated pieces have very hard, close-grained paste and lustrous glaze. Enamel colors were rich and mellow, very pure and brilliant: green, Prussian blue, red, purple, black, yellow and gold. We are told by experts that few Western collections contain representative pieces of this greatly prized variety; instead, they are the later ware of "crude, chalky pâte" and glaze "fissured" not finely crackled, pigments less brilliant, and the motifs of saints, Bodhisatvas, Arhats, human figures, etc., though executed very skilfully, produced for export and not purchased by Japanese connoisseurs. The highly valued early ware motifs were diapers, landscapes, flowers, phœnix, lion, dragon, kirin. Such pieces rarely reached higher than seven inches and consisted of censers (*koro*), cups, slender-necked wine-bottles (*saki-dokuri*), incense boxes (*kogo*), ewers (*suiteki*), vases (*shoku-sh'ta*), etc. Large pieces in Western collections are said to be modern. Most specimens sold as Satsuma are modern and were made at Ota and Awata.

Banko-Yaki, at first, was an unglazed raku ware made, end of the 18th century, by a

wealthy amateur, Gozaemon. Patronized by the Shogun, he imitated contemporary Chien-lung (see CHINESE CERAMICS), also Delft faience (see DELFT FAIENCE), besides some original effects in brilliantly glazed floral decoration. His mark was *Banko* (enduring). This is Ko-Banko-yaki, distinguishing it from the later imitations by Yusetsu marked with the same stamp.

Kioto-Yaki first came to favorable notice in the 17th century and were more or less crude pieces in red unglazed pottery; a coarse raku-yaki in white, black and yellow glazes; faience in fine pâte and yellowish brown glaze; unglazed fine pâte buff pottery with black decoration and gold lacquer; faience with crackle glaze and blue or brown underglaze decoration; the last a highly refined artistic ware. Ninsei and his followers made remarkable pieces for the court.

Awata-Yaki.— Japan's great ceramic expert patron, Ninsei, made the wares of this place famous. The representative ware is a brownish hard, close faience of grayish, semi-transparent glaze, profuse enamel decoration in bright green and opaque blue, chiefly, with gold and silver enrichments. Red, purple and yellow are found. Clever designs (detached subjects such as sparrows on bamboo, a plum branch, etc.) were done by Kinzan (Sansei) who died 1743, and was succeeded by a son and grandson. Kinkozan introduced a conventional decorative style, instead of the former naturalistic. Dohachie started a kiln here middle of the 18th century, and his artist, Shofutei Kuchu, acquired fame, as well as his son. Hozan did clever landscapes and floral scrolls in underglaze blue on faience; his grandson's (Bunzo) imitation Delft flourished with his white floral decoration on rich blue background, and his Warabi-de (fern scroll) style. Taizan Yohei established a raku kiln in 1711, and his ninth successive generation is now making wares here. Awata pieces are often sold as Satsuma, though much less dense of body than the latter.

Bizen-Yaki kilns existed from late 14th century, making coarse red stoneware. Paste improved end of 16th century, and then the ware (ritual pottery) became known as Ko-Bizen or Imbe-yaki. It had accidental patches of glaze, later full glaze. In 17th century appeared bluish-brown faience (*Ao-Bizen*) in figures, mythological beings, birds, fishes, etc. In the 18th century came a red body; Hi-dasuki Bizen (16th to 19th centuries) shows the mark of the rope of straw left on the clay. Shira-Bizen is of grayish white paste and is called also Kankoku from the location where made.

Of the many other old kilns held in high esteem by the Japanese we will mention only the following: Akahadi-yaki, dating far back, had little of merit till Nomura Ninsei started improvements here, as in other places. In 1761 its faience was of "buff-colored lustreless glaze" with minutely executed vitreous enamel decoration (red favored); monochromatic glazes as well as variegated appear in olive, green, brown, gray, white. A raku type of ware was made with dull gold background for floral and diaper decoration. Asahi-yaki started by the 5th century, chiefly unglazed. But, middle of the 17th century, Josaku copied Korean Go-hon and produced cups, bowls, etc., in dull-red or gray coarse paste, glaze coarsely crackled in patches of variously toned red. They are valued by tea clubs.

Japanese Porcelains.— In discussing Japanese porcelain it is necessary to remember that the Japanese, unlike the Westerners, admire and even venerate their old (*Ko*) earthenware, however crude if ancient, and prefer a less pretentious appearance in their ceramic criterion than is displayed by the bright white sheen of porcelain. Therefore the very great industrial progress in porcelain manufacture made by the

Red Raku Tea Bowl, by Honnami Koyetsu. (Metropolitan Museum of Art, New York).

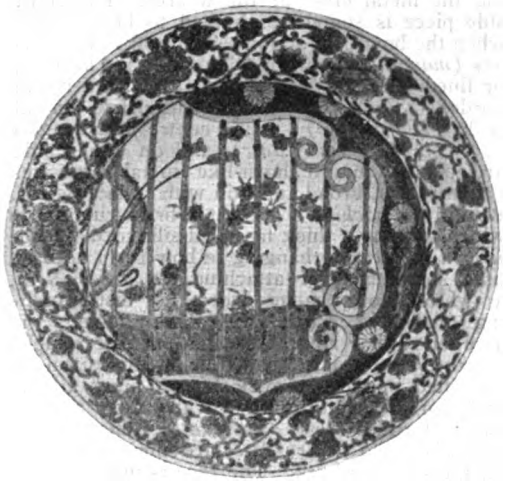
natives of Nipon was produced under the stimulus of a European demand; the style of decoration, though the motifs and methods of treatment are great in the merit of artistic creative talent, leans largely toward the desire to please and satisfy Occidental desires. Japanese clays, apparently, forbid the one-process firing of the Chinese kilns; they first bake to a "biscuit" state. (See CERAMICS). Colors requiring the *grand feu* (intense) heat, also the glaze, are next subjected to the high temperature kiln. Lastly, the enamel-color and gold decoration are baked in the muffle oven. The provinces which produce porcelain are Hizen, Kaga, Kioto and Owari, and the ware often receives its name from the province.

Conflicting claims as to the discovery of porcelain clay in Japan give to Kanagai Risampei (about 1605) or to Takahira Goroschichi (1625) the credit. The latter is said to have found porcelain stone at the hill Izumi-yama (Hizen province), but as a recent opening of the grave of the former disclosed blue underglaze true porcelain made from Izuma-yama clay, it would appear 1605 was the date of the discovery. And now was made the "Old Japan" ware prized of Western collectors. It was made at Arita, Hizen province, and sent to the port of Imari, whence the European traders exported it to Europe. Hence we find the anomalous fact that one and the same ware is known to the Western World as *Arita, Hizen* and *Imari* ware.

Arita Ware.—Sakaida Kakiemon was Arita's chief potter in early days, and learned the process of making red and green enamels. By

1 Bowls and Oil Bottle. Karatou, Banko and Seto Ware. (Late 18th Century)
2 Japanese Nabeshima Polychrome Plate (about 1780). In Metropolitan Museum of Art, New York.

1646 he started making a ware that became world renowned. With a blue underglaze of fine quality and lustreless red, green and blue enamels (overglaze) and gold, and, by creating a new style of decoration, on fine paste and milk-white glaze, the product was superb. Avoiding the Chinese system of filling in the spaces with accessories, Kakiemon satisfied himself with carefully painted medallions, a piece of bamboo, or plum or pine, a phœnix, or fluttering birds, leaving the large remaining space as untouched ground color. By 1660 the style was in its perfection; and his descendants continued the now famous Kakiemon style. Early underglaze blue decoration was perfect, but in the later output it has a tendency to "run" when subjected to the second firing, making specimens with unblurred blue in the decoration quite rare. On account of its diaper,



Porcelain Plate. Arita Ware (Hizen Province); 18th Century. (Metropolitan Museum of Art, New York).

scroll and floral subjects the early Arita pieces were termed Nishiki-de ("brocade pattern"). In the 17th century already European made-to-order tendencies appear in both shapes and decorations, and lilac blue, russet-brown, purple black and lemon-yellow were added to the enamel palette. Arita "egg-shell" was not made probably till the latter part of the 18th century, and the "warriors in armor" and "courtesans in elaborate costume" figure subjects are strictly modern, for the most part. Chinese marks prevail. Seto made, besides its earthenware (*Toshiro-yaki*), porcelain, in fact it became so well known in Japan as to cause all porcelain ware to be termed Setomono. *Kutani-yaki* (Kaga province) is a porcelain made since middle of the 17th century, but to Goto Saijiro, some years later, is successful work due. Its two wares are Ao-Kutani, with brilliant deep green glaze, also blue, purple, yellow colors in designs of diapers, floral and scroll motifs, etc.; another ware ("red" variety) had, mainly, red and green, assisted by blue, purple, yellow, gold and silver. The soft, opaque Kutani red is noted. The artist Kuzumi Morikaga's Kano school style miniature landscapes, sparrows, "ruffed" flowers, are admired. Ko-Kutani (old ware) vases, plates, small dishes, cups, saké bottles, censers, incense boxes (*kogo*) are scarce and prized, but by 1750 only common wares were being made. In 1809 the factory was moved to Yamashiro-mura and Ko-Kutani style revived till 1865 in stoneware body with lustrous glaze colors (green, purple, blue, yellow). Kutani red decoration pieces are known now as *Kaga*. A Satsuma porcelain kiln was started in 1661, but ran only two years; in 1779 Arita style porcelain was made here of some merit in its paste, softer and whiter than Imari, its enamel decoration gave place, in 1868, to blue and white. *Hirado-yaki* — Brinkley says this is "perhaps the finest porcelain manufactured in Japan.". Made at Mikawachi-yama. Originally made heavy reddish stoneware, but fine porcelain stone, discovered at Fukae (1712), mixed with local material produced a body of "exceptional fineness and purity." Matsura, the Hirado chief, subsidized the factory forbidding sales and only court and presentation ware was produced — termed Kenjo-mono. It has a velvet-like, lustrous surface, without the "Old Japan" granulation. Decoration is mostly blue of exquisitely soft and clear tone in details of wonderfully clear details. Pieces are of all forms, even human figures, children, Bodhisatvas, etc. Few of the finest pieces are marked. Japanese porcelain varieties and kilns are innumerable.

The subject of Japanese ceramics would be very imperfectly told without special mention of their great genius, Hozan, second only to Ninsei. He was 11th descendant of a ceramic family noted for their fire-boxes (*furo*). Early in the 19th century he studied at Awata and soon became famous for his céladons, blue-and-white porcelain, faience, especially imitations of Cochin China faience. The chief of Kishu (1827) invited him to start a kiln in his castle park, where he made the celebrated Oniwa-yaki (honorable park ware) or Kairaku-en ware. His aubergine porcelains, combinations of turquoise blue, purple and yellow faience glazes were far superior to later ones. His famous "Kinrande" (scarlet-and-gold brocade) style, or "Akaji-kinga" (gold designs on red ground), bear the "Eiraku" stamp. This red was lustrous yet exquisitely soft. In 1840 he opened a kiln in Narikata-machi (in Kioto), where he made faience in Ninsei style. His pieces from this kiln are called "Omuro-yaki." Later he made blue-under-glaze on Lake Biwa shore, in Akaji-kinga style under the name Butsuya, and died about 1855. *Marks:* Some are impressed with a seal, some scratched, some painted. They are frequently the names of places where made, as Asahi, Minato, etc., but the potter's name is the most frequent.

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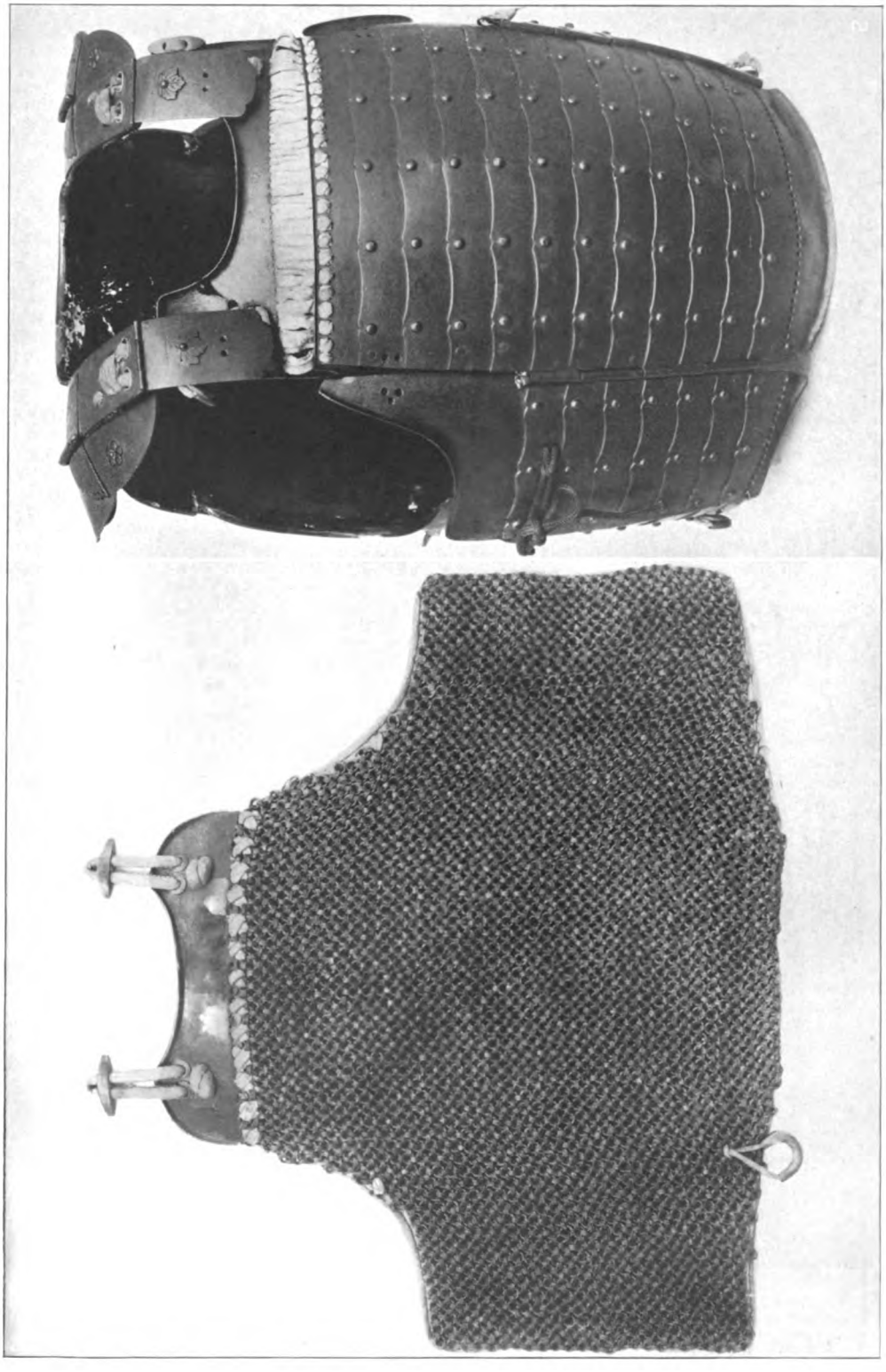
CLEMENT W. COUMBE.

JAPANESE LACQUERWORK. See LACQUERS AND LACQUERWORK.

JAPANESE AND ORIENTAL ARMS AND ARMOR. Nippon's upper classes have, from the very distant past, shown a depth of study and reverence for the fashioning of arms and armor, including a complex etiquette, that amounts to a military cult. Their Samurai were fighting nobles devoted to military achievement as a career. Their warriors (*bushi*) lived in religious devotion to their martial ethics — termed *bushido*. Mr. Bashford of the Metropolitan Museum of Arts, New York, writes: "Japan is hardly second to Europe in furnishing artistic examples of arms and armor."

Armor (*Yoroi*).— The earliest armor was of sheepskin or oxhide, then (before the 7th century) it was of leather. By the 7th century iron armor was in use; this was a corselet of iron plates rivetted together, a flaring skirt of metal, leather guards for shoulders and the upper arm and a conical helmet. By the 16th century guns were introduced, but the ethics of warriors upheld the use of their revered longbow and arrows (so inseparable was the bow and arrow in their ideals that *yumi-ya* is synonym of both), and their religiously reverenced sword (*katana*). And the light and loose-hanging armor continued in constant use, conservatively retaining the same parts though subject to changes in fashion. The headpiece (*kabuto*) consists of three parts: the *hachi* or skull, the *shikoro* or articulated neck protector, and the *maye-zashi* or peak. At the sides are curved wing-pieces (*fuki-gayeshi*), sometimes part of the *shikoro*. Varieties of the *hachi* are: *dzu nari* and *saku nari* (shaped like the crown of the head), *mono nari* (peach shaped), *tokamuri* (form of the *kamuri* ceremonial hat), *kimen* (demon's head), *shii nari* (nut shaped), *toppai* (tall conical form flattened at sides). The bowl (*hachi*) is of iron or hard-lacquered leather in a single piece or of rivetted strips. The *tatami kabuto* (folding helmet) is constructed of loosely joined articulate circlets capable of closing up more or less flat. The ordinary *hachi's* outer surface is composed of numerous elongated triangular ribs running from the lower rim to the socket surrounding the opening in the apex. The outer rim of this socket is termed *hachiman-za*, and is sacred to the god of war and used for occult decoration, often an embossed or engraved conventional chrysanthemum (*kikumon*), when it is called *kiku-za*. A silk cloth sometimes closed this opening against the weather and was fastened by strings to four metal knobs called *shi-ten-biyo* (four Dêva knobs). For higher ranks are added quarterings in gold and silver in bands extending from the *hachimanza* to the back and front, sometimes also to the sides, thus dividing the helmet ornamentally into two, four or eight parts (termed respectively *kata-jiro, shiho-jiro, happo-jiro*). Small holes on four sides allow thin leather strips to connect with the inside cap. The *shikoro* (neck defense) consists of either three, five, six or seven laminated metal plates or stiff leather of a curved form fastened together with silk cords. In some examples the laminations consist of small metal scales (*kozane*), 100 to 136 in a row. The inner side of the *shikoro* is usually coated with bright red lacquer (said to reflect fierce color on the warrior's face). The before-mentioned *fuki-gayeshi* (curved wing pieces) at the sides are generally fastened to the edge of the *shakoro* plates and curl round projecting at the sides. They are generally covered with ornamented leather and a decorated border, the centre having the metal crest of the wearer. The right side piece is sometimes hinged to be movable when the bow is in action. The peaks or frontlets (*maye-hashi*) are inside of gilt, red lacquer, or lined with red leather, usually with a metal border. Each has a three-branched metal socket (*harai-date*); in the centre is a dragon or crest form (*mayedate*), and on either side are placed curved horn-like metal branches (*tsunamoto*), broad and thin with foliated ends. Behind the *hachi* is a decorated brass ring from which to hang a thick tasselled silk cord (*kasajirushi no kuwan*) hanging in bow form behind, used sometimes for attaching the *kasajirushi*, a white cloth badge worn as distinguishing mark in battle. In some helmets is another similar ring above this one for attaching the *horo*, a large bag, filled with cotton or stretched on wicker-work frame, hung at the back for the protection of cavalry from arrow-shots. Besides crests (*mayedate*) other badges (*wakidate* and *ushiro-date*) are sometimes worn on the sides or back. The face is protected by a visor (*menko* or *saku-bo*) separate from the helmet and attached by strings; it is a metal mask covering the whole features (then termed *mempo*) with eye and nostril perforations, or only covering the cheeks and portion below the nose (then termed *ho-ate*). The masks are named according to the character of the features, as: *tsubame-bo* (swallow-face), *suru-bo* (monkey-face), *okina-men* (old-man's face), *shiwadzura* (wrinkled face), *waradzura* (young boy's face), etc. The *menko* is generally made of one piece, except the nose and upper lip covering which is generally detachable for eating and drinking. Two small holes with metal tubes near the bottom of the mask give egress for perspiration. Hair of the wild boar, horse or deer are furnished for the upper lip, chin and cheeks, usually, but they are sometimes painted. Deep wrinkles appear, sometimes, on the cheeks to prevent a weapon slipping over the smooth surface into the eyehole. Knobs afford hold for the fastening cords. A kind of gorgette (*yodare-gane* or *yodare-kake* or *yen-u*) hangs from the bottom of the *menko* made of either laminated plates, leather, or chain mail and widening gradually toward the bottom. The Japanese had a half-helmet (*han buri*) or skull cap of leather or metal worn instead of the *kabuto*, some reaching to the temples, some only covering the crown. The former consisted of several hinged plates, and had ear-holes and



Japanese Seventeenth Century Corselet. Prawn Back

Japanese Seventeenth Century Corselet

OLD JAPANESE ARMOR

1 Helmet and Mask (*hooki*); Seventeenth century
3 Helmet (*hachi*), Corselet and Taces; Fourteenth or Sixteenth Century
2 Arm Defences of a Daimyo; Eighteenth Century
4 A Sixteenth Century Kabuto
5 Skull-piece (*hachi*) of Japanese Helmet; about 1850. (In Metropolitan Museum of Art, New York)

a hole on top for the tuft of hair, and was covered with leather, the ends being used for tying beneath the chin. The Japanese term *do* takes in trunk armor and leg as well as posterior protective parts. The *do-maru* was a corselet opening at the side, the *hotoke-do* was of a single piece of metal wrought into the form of a naked torso. Such pieces are usually black, some covered with shark-skin are termed *same-tsudzumi;* when covered with tortoise-shell, velvet, silk, etc., they are called, respectively, *bekko-tsudzumi, birodo-tsudzumi, moji-tsudzumi,* etc., while those covered with leather (*kawa-tsudzuma*) were given also names according to the styles of leather used such as, gilt, blue, lacquered, diapered, etc. Polished brass, iron inlaid with colored or precious metals, were the material of some *do-maru.* Folding corselets (*tatami-do*) had two or four plates (*shinai-kane-no do* and *nimai-kane-no do*) hinged at the sides and fastening with clasps and strings. The *hato-mune do* ("pigeon-breasted") corresponded to the bulging 'peas-cod" European cuirass. The *oke-gawa do* was a *do-maru* composed of metal or hard leather scales overlapping. The skirt-pieces (*kusadzuri*) depending from the corselet, taking the place of European "taces" (see PLATE ARMOR), in old armor were each in a continuous piece lengthening toward the bottom considerably, the lower part having a central slit to facilitate the movement of the legs. In later armor the *kusadzuri* consisted of a number of taces hanging quite loosely and overlapping; the front portion was divided into three, the back three or four, and one piece at each side. They were laminated plates or scales hung by a row of silk cords. Pieces corresponding to the European "l'palettes" (see PLATE ARMOR) were the *sendan-no-ita,* for the right side and the *hato-wo-no-ita,* for the left side, protecting the front of the armpits. They are only on old and perfect specimens. Right and left had different shapes, hence different names. The former was a narrow board (3 inch x 9 inch) composed of three plates or rows of scales connected by cords and lined with leather; the *hato-no-wo-ita,* smaller than the other, is an oblong piece of metal or thick lacquered leather having a kind of dove-tailed projection above. Both are suspended from the *watagami* (shoulder braces). The *sode* (*epaulièr e* in European armor) protected the shoulder and upper arm, it consisted of a broad, slightly convex, piece made of laminated steel plates or imbricated scales and lined with leather, and was suspended from the *wata-gami* by cords of leather. There were several varieties of *sode* such as the *kawara-sode, namban-sode, maru-sode, ha-sode, hiyotan-sode, ki-no-ha-sode,* named according to their make up and shape. The *kote,* in some respects, answers to the European *avant-bras* and *brassart* (see PLATE ARMOR), being a tight defensive sleeve protecting the entire arm. It was of padded cloth, leather or silk, widening at the mouth, where it fits the shoulder, and was tied by strings round the chest. The *kote* is covered in part by mail with additional metal plates and terminates in a metal hand-guard or semi-gauntlet called *tetsu-gai.* They only cover the front of the arm and are laced behind. The top plate (*kamuri-ita*) covers the shoulder, below is a large metal plate (*gaku-no-ita*) or scales connected by mail to protect the muscles of the upper arm. A circular plate (*hiji-gane*) protects the elbow point. The lower part of the fore arm has long parallel splint-like strips of metal connected by chain mail (the *ikada*) or a single piece of pierced and embossed metal. Attached to this, at bottom, is usually a second plate (*tetsugai*) rounded to fit the shape of the back of the hand above the knuckles. Gloves also were worn. *Kote* varieties: *tsutsu-gote* mail covered and reinforced with plates; *tsugi-gote* shaped more like the *sode,* but smaller. Protecting the thighs, as do European "*cuissards,*" was the *hai-date* hanging loose like a double apron, which was made in different styles known as *ita-hai-date, odoshi-hai-date,* etc. The Japanese defenses for the lower part of the legs (called *sune-ate*) are mostly curved plates formed to the calf and fastened by clasps or strings, like the Greek and Roman greaves. Varieties are *bishamon-sune-ate* made of three continuous metal plates reaching above the knee; *shimotate-sune-ate* made of plates and strips of chain mail alternating; *tsutsu-sune-ate, nivo-sune-ate, kiyahan-sune-ate,* etc. The feet were clad with shoes (*kutsu*) having pointed curved toes for riding or ceremonies, but straw sandals were preferred for marching and fighting. Soles were of stiff leather, uppers of bear's skin. The *jim-bauri* was a kind of tabard or surcoat worn over the armor for display.

Arms.— The sword was the Samurai's most valued possession; he called it his "soul." But the longbow and the arrow were always a chief weapon. The long sword (*katana*) was preserved with religious care wrapped in the finest silks and enclosed, often, in the costliest of lacquered and inlaid caskets. Allowing a view of its sheath and blade (Japanese blades are of great perfection and superior to the Western) to a foreigner is a mark of intimate friendship. The short sword (*wakizashi*) and the *katana* were so closely associated as to be considered a "pair" and termed *daisho,* and both had similar mountings and were stuck in the same sheath. A dagger-sword (*tanto*) was also carried. Great artistic talent was expended on the Japanese warrior's sword "furniture": sword-guards (*tsuba*), ferrule-like pommels (*kashiri*), ring-bands (*fuchi*), decorative peg-heads (*menuki*), to attach blade to the grip. So lovely is the workmanship of the *tsuba,* depicting life and scenery in marvelous metallic delicacy, that these miniatures in metal (the wealthy carried actual "stocks" for frequent changes of display) are greatly prized by museums and Western connoisseurs, who have numerous large collections. A peculiar instrument was the small knife (*kozuka*) with its flat ornamented handle; it was used with remarkable precision for throwing. Skewers (*kogai*) were in the same sheath with the *kozuka,* used for hairpins, also to "tag" the dead victim with the victor's identity. *Pole arms* — The spear was a favorite weapon with the Japanese, who were very skilful in its use, the higher classes having many racks full. One old form was the *hoko,* a guard's spear with six-foot pole and eight-inch blade either leaf-shape or waved (like the Malay *kris*); a sickle-shaped horn projected on one or both sides at the joint of blade. A lance (*yari*) was used by the 14th century with "hog-

backed» blade five inches long. The *nagi-nata* had a three-foot long scimiter blade fixed on a slightly longer haft. It was a weapon favored by female warriors. They had halberds (see POLE ARMS) also. Spear heads were of beautiful construction. While the Japanese in their feudal warfare did not make much use of firearms they had guns, pistols and cannon, mostly imported by 16th century Portuguese traders. Little development occurred in these arms, and from 1853, when Commodore Perry opened up their ports, they copied European types (revolvers, etc.).

EAST INDIAN.

Armor.— Helmet, *top*. Gorget or neckpiece, *kant'hah sobha*. Cuirass, *char'aina* ("four mirrors"), *Peti*. Coat with gorget attached, *bhanju*. Coat of mail, *zirih* or *zirah*. Coat of mail having head and body in single piece, *g'hug'hwah*. Coat worn over the armor (surcoat), *angirk'hah*. Armguard, *dastana*. *Horse armor*. *Quashpah*, horse's headpiece.

Arms.— Shields: Ordinary shield, *dhal, maru;* shield made of cane, *udanal*. Spears, pointed at both ends, *tschehontah; sangu, bhala*. Bomarangs, *katariya*. Battleaxes, *tarangaleh* (common axe), *tabar-zaghnol* (pointed, crowbill), *tabar-zaghnol* (double-axe), *shushpar* (globular head), *buckie*. Swords. Scimeter, *baneh, bhelhetah, ayda-katti, khanda, pattisa, pata* (gauntlet sword), *dha* (short sword), *abbasi, gupti* (swordstick—concealed). Sabres: *Talwar, tegha*. Daggers: *Katar* (short dagger), *jamdhar* (ordinary dagger), *jamdhar doulicaneh* (dagger ending in two points), *jamdhar sehlicaneh* (ending in three points), *jambiyah, bank, pichangatti, gupti kard* (long dagger). Bows: *Maktah* (simple bow), *raman* (composite bow), *tarkash, gulel* (pellet bow). Arrows: *Tir* (iron-tipped), *bitla* (hardwood-tipped). Maces. *Gargaz* or *garz*. "Tiger-claw" knuckles, *bag'hnak*. Guns. *Toradar* (matchlocks).

SIAMESE.

Arms.— Single-bow, *kasun*. Cross-bow, *thami*. Spear, *hak* (plain spear), *hak sat* (seven feet long, thrown by the foot). Lance or javelin, *khoum* (seven feet long). Swords. *Dass* (long curved sword), *ngao* (curved knife or sword 18 inches long with 6 foot pole). Shields. Oblong, *dang;* round, *lo*.

Malays use a *kris* (undulating dagger or sword) and straight sword.

Persia, Kashmir, Afghanistan, etc. Sabre, *samsher*. Sword, *salawar yataghan*. Battle-axe, *tabar*. Daggers, cuirass same as India.

Chinese.—Armor and arms of the Chinese are of little interest. They have had no military caste for many centuries and the little inconsequential armor found is of a "parade" or "costume" form, consisting chiefly of rich vestments with some splints or other reinforcements beneath of little practical defensive value. They used bows and arrows, swords, daggers, maces, trident spears, etc.

Arab Arms.— The *jambiya* was the characteristic dagger. The sword was termed *khanjar;* shields were circular and oblong, of hippopotamus hide. Maces were of ebony. Guns and pistols are generally decorated (some very beautifully) with arabesque ornament.

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CLEMENT W. COUMBE.

JAPANESE STUDENTS IN AMERICA. In the latter days of her hermitage, under the laws of exclusion and inclusion, formulated by Iyeyasu (q.v.), far-sighted Japanese urged the importation of foreign experts and the sending of young men to study abroad. In 1861, six were dispatched to Holland to master modern naval science. They returned to Japan in 1866 in a warship built at Amsterdam. Of these, Akamatsu and Enomoto rose to be admirals in the Japanese navy. Yokoi Héishiro sent to America his two nephews Ise and Numagawa in 1866 and a youth from Fukui, named Kusakabé. Another party of nearly a dozen lads from Satsuma had got away secretly and some of these were for a time with Thomas Lake Harris, in his settlement on Lake Erie; but all went sooner or later to New Brunswick, N. J., and into the grammar school or Rutger's College. Immediately on the formation of the new Imperial Government in 1868, Dr. Guido F. Verbeck, an American missionary at Nagasaki, who for eight years had urged the matter, went to Kioto and interested high officers in the enterprise, and scores of promising young Japanese were sent abroad. Reporting first to Rev. John Mason Ferris in New York, their adviser, they scattered into other institutions, in order to learn English more rapidly. Within a decade, they were found in almost all the Northern States. Since 1866 the stream of these passionate pilgrims has been continuous, and with the war in Europe the actual and relative number in the United States after 1914 became larger than ever. Of these students, the majority now come at their own expense, or are sent by relatives, yet the Imperial Department of Education selects and

sends regularly special students, most of whom now being previously either professors or graduates of the higher schools in Japan. From very incomplete but suggestive records since 1866, it seems that the overwhelming majority of these seekers after knowledge subsequent to their return home turn out well. Fully one-half fulfil careers above the average of the stay-at-homes. Probably 90 per cent of those coming pursue studies in the physical sciences and useful arts; others in law, history, ethics or political theory; a still smaller but influential minority take courses in the language and literature or attend the theological seminaries. Over 30 are known as professors, instructors or trained assistants in American colleges or in bureaus of research. In the earlier years of this movement not a few inquirers went back more in love with Oriental civilization than before. Many fell victims to climate, overstudy or lack of harmony with their new environment. Soon, however, that elastic power of adaptation, which is part of the national genius, asserted itself. In both physical and mental health and in acceptance of Occidental ideas, these students now go back to hasten that union and reconciliation between the Orient and Occident that must make for the mutually advantageous benefit of the whole world and race. It is probably a moderate estimate that places the number of the Japanese students in America since 1866, who sought the higher institutions in preparation for professional leadership at home, at not less than 20,000. Nor is this interest in education confined to the male sex. In 1872 six girls were sent to America, two graduating at Vassar and one at Bryn Mawr, who were later very influential in Japan; one being the Marchioness Oyama (q.v.), another the Baroness Uryu and a third, Miss Umé Tsuda, who has made a remarkable record as educator of women. She has been the soul of the movement which resulted in the opening of the Woman's Christian University in Tokio, 25 March 1918. Of the first school for girls, under government auspices, in Tokio, 1872, Miss Margaret C. Griffiths was the principal. After its evolution into the Tokio Female Normal School and the Peeress's School, several score Japanese girls have studied or graduated from American women's colleges. *The Japanese Student*, a periodical which covers the interests of this class, is published in Chicago.

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WILLIAM ELLIOT GRIFFIS.

JAPANESE WAIFS IN AMERICA. The question of the aboriginal peopling of the American continent, presumably from Asia, receives light from the historic record of ships with men and women, mostly fishermen and boat people blown out to sea and into the Kuro Shiwo (q.v.), whence they would drift or be carried to the shores of the Aleutian Islands, the coast of British America and the United States and thence to Hawaii. From time unrecorded, there has existed a current in which boats would be borne northward and eastward and yet for the most part be in sight of headlands by day and be lighted at night by volcanoes, in a part of the Pacific Ocean and in comparatively shallow water, wherein it was not impossible to obtain food. The marine myths of the Polynesians, Filipinos, Formosans and Japanese are reinforced by the numerous traditions of fishermen, sailors and passengers that went out but never returned. So long as the Pacific Ocean was unvexed by the keels of European or other large ships, there could be no record, but as soon as these appeared, which was after the edict of Iyeyasu (q.v.) in 1624, which forbade the building of sea-going vessels and commanded the destruction of those already built, leaving only junks and smacks, the record of waifs picked up at sea begins. From 1782 to 1876 there were collected, by C. W. Brooks of San Francisco, certified instances with dates of 49 Japanese junks wrecked, met or seen on American and Hawaiian shores. Of these, 19 stranded or their crews landed on the Aleutian Islands, 10 in Alaska or British America, 3 on the coast of the United States and 2 on Hawaiian shores. All the others were picked up in the currents which flow from Japan and via Alaska to California and bend to Hawaii. Some of these junks were black with age, full of live fish, water-logged or out over 18 months. An average crew of a junk is 10 men, not counting passengers. Of the number of live human beings noted, the average was 14, of those found dead 7; or, when not definitely stated, many, several, or a number. Reports of other instances of men landing from foundered junks are numerous, but without exact data. For several years after 1876 the writer cut out the references in newspapers to other waifs found, and instances still occur yearly; but probably not so often as in the era of non-ocean-going ships. Only a few instances of females found on board were noted, though Japanese women often live upon and go out on fishing boats with their husbands or kinsfolk. Arguments from language, physiognomy, customs, superstitions, implements, flora, fauna, games and coins found are not wanting. Unaltered Japanese words are found in the Indian vocabularies of the Pacific Coast, and the entire field awaits a competent tiller. Of the waifs rescued, mostly by American captains, some returning to Japan became famous, such as Nakahama Manjiro and Heco (q.v.), who wrote books; Sam Patch, Dan Ketch, Kinzo and others, who acted as interpreters. Consult Griffis, Appendix to the first edition of 'The Mikado's Empire' (1876); Nitobé, 'The Relations Between the United States and Japan' (1890).

WILLIAM ELLIOT GRIFFIS.

JAPANNING, the art of giving a brilliant finish to a surface by applying several coats of varnish, dried and hardened so as to be fixed. The article to be japanned is first brushed over with two or three coats of priming. It is then covered with varnish, previously mixed with a pigment of the tint desired. This is called the ground color; and if the subject is to exhibit a design, the objects are painted upon it in colors mixed with varnish, and used in the same manner as for oil-painting. The whole is then covered with additional coats of transparent

varnish, dried or baked on and polished. The process is subject to considerable variation, being a combination of painting and partial enameling. See LACQUERING; VARNISH.

JAPHETH, a son of Noah and progenitor of the branch of the human race called Japhetic, born when his father had attained his 500th year (Gen. v, 32). For his act of filial respect to his father (Gen. ix, 23–27) he received the latter's blessing and promise of future enlargement, when his descendants would extend over the world, with Canaan his as well as Shem's servant. Married before the Flood, he and his wife were saved in the Ark. The birth of his seven sons occurred after the Deluge (x, 1). The name has been variously explained. According to Gen. ix, 27, it is derived from an Aramaic root, signifying "to expand," in allusion to the wide expansion of Japheth's descendants in the west of Europe and north of Asia, including Armenians, Medes, Greeks, Thracians, etc. Others trace it to the root "fair," in reference to the light complexions of his posterity. The former derivation has most in its favor. Arab legend invests Japheth with wondrous powers (Weil, 'Bibl. Leg.' viii, 46) and mentions 11 of his sons as founders of as many Asiatic nations. But the gift of imagination was not given to rabbinical and Mohammedan writers alone. Some more modern authors seek to identify Japheth with the Iapetos of Greek fable (Margoliouth in Hasting's 'Dict. Bible'), whose wife, Asia, bore Prometheus, civilization's founder. The word, too, has been loosely employed by some philologists in the term Japhetic or Indo-European languages, in contradistinction to Semitic and Hamitic. The homiletical tendencies of the rabbis are exemplified in the Midrashic comment on Gen. ix, 1, when God blessed Noah and his sons. In blessing Japheth He promised that all of his sons should be white and gave as their portion deserts and fields. (*Pirke* R. El. xxiv).

JAPIKS, jä'pĭks, **Gijsbert,** Frisian poet: b. Bolsward, 1603; d. 1666. He was carefully educated and became a schoolmaster at Bolsward. He made translations from French verse and also wrote a number of versions of the Psalms. His original verse was exceptionally meritorious and did much to restore the Frisian dialect to its place in literature. His 'Friesche Rymlerge' (1668), was edited by Epkema (Leeuwarden 1821; with vocabulary and grammar, 1825). Consult Halbertsma, 'Hulde aan Gijsbert Japiks' (Bolsward 1824; Leeuwarden 1827).

JARARACA, zhä'ra-rä'ka, a venomous South American serpent of the crotaloid family, classified as *Lachesis jararaca, Bothrops jararaca,* and also as *Trimeresurus jararaca,* a closely allied species being the labaria, *Trimeresurus atrox,* from which it is almost indistinguishable. The jararaca ranges from the Amazon regions southward to Saõ Paola and westward to Peru and Ecuador. The color is grayish brown, splotched with darker brown above and gray beneath with longitudinal rows of whitish or yellowish spots. The bite is generally fatal.

JARDIN D'ACCLIMATATION, zhär'dăn dä'klē'mä'tä'syoń', Paris, a plot of 50 acres in the northwest angle of the Bois de Boulogne devoted to the acclimatization of foreign plants and animals. It was founded in 1854, and contains more animals, except beasts of prey, than the Jardin des Plantes. It has also a permanent exhibition of the processes and equipment of a dairy, aviary, greenhouses, poultry and carrier pigeon raising and gardening, and there is a winter garden and an aquarium. It forms a popular resort for pleasure and information.

JARDIN MABILLE, zhär'dăń mä'bēl', Paris, a popular resort of the demimonde founded by a dancer, Mabille, in 1840 and continuing one of the showplaces of the city until its close in 1875. It was celebrated for its beautiful fittings and for its originations in dancing.

JARDIN DES PLANTES, zhär'dăń dā plănt, Paris, a plot of 74 acres originally known as the Jardin du Roi, founded by Guy de La Brosse, physician to Louis XIII in 1635 as a garden for medicinal herbs. After the appointment of the Comte de Buffon as director, in 1739, the menagerie, galleries of collections, libraries, laboratories and lecture-rooms were established there and since 1794 it has been known as the Muséum d'Histoire Naturelle.

JARDINE, William M., American agronomist: b. Oneida County, Idaho, 16 Jan. 1879. In 1904 he was graduated at the Agricultural College of Utah and subsequently studied at the Graduate School of the University of Illinois. Until his 20th year he lived and worked on ranches in Idaho and Montana; in 1904 was made assistant in the department of agronomy, instructor in 1905, and professor in 1906 at the Agricultural College of Utah. From 1907 to 1910 he was engaged as assistant United States cerealist in charge of dry land grain investigations. In 1910 he was appointed agronomist of the Kansas State Agricultural College and Experiment Station. For the first quarter of 1913 he was acting director of the Experiment Station and dean of agriculture and since April 1913 has served as director of the Kansas Experiment Station. Mr. Jardine is the author of numerous papers and bulletins on dry farming and crop production. In 1915–16 he was president of the International Dry-Farming Congress and Soil Products Exposition. He is a member of the American Society of Agronomy, of which he was president in 1916–17, and Fellow of the American Association for the Advancement of Science. Mr. Jardine is one of a group, including Willet M. Hays, Niels E. Hansen and others, who have wrought effectively in the uplift of agriculture in recent years.

JARNAC, zhär'nak, France, town in the department of Charente, on the river Charente, 23 miles west of Angoulême. It has a large trade in brandy and wine and manufactures wine casks. It was the scene, 13 March 1569, of the defeat of the Huguenot forces under Condé and Coligny by the Catholics under the Duke of Anjou. Pop. 4,894.

JÄRNEFELT, yĕr'nĕ-fĕlt, **Armas, Finnish** composer: b. Wiborg, 14 Aug. 1869. He studied under Wegelius and Busoni at the Conservatory at Helsingfors, under Massenet at Paris and Becker at Berlin. He became conductor of the theatre at Magdeburg in 1897, at Düsseldorf

in 1898, and principal conductor of the Royal Opera at Stockholm in 1907. He succeeded Wegelius as director of the Helsingfors Conservatory in 1906. Among Finnish composers of the present day he ranks next to Sibelius. Author of a number of overtures, suites for orchestra, choral work with orchestra, male choruses, piano compositions, serenades, fantasies and the symphonic poem 'Korsholm.'

JARO, hä'rō, Philippine Islands, name of two towns: (1) In the northern pa of Leyte Island, 15 miles southwest of Tacloban, in a mountainous district. Pop. about 12,475. (2) In the province of Iloilo, Panay, on the Jaro River, two miles northwest of the capital city, Iloilo. It was founded by the Spanish in 1584, and in 1903–08 it was a part of the municipality of Iloilo, but resumed its separate identity. It is situated in a rich agricultural district producing sugar, and manufactures silk, cotton and pina tissues. Pop. 10,681.

JAROSITE. A mineral consisting of a hydrous potassium ferric sulphate, $K_2O\ 3Fe_2O_3\ 4SO_3.6H_2O$. It is common in many mines of Utah but of no economic value.

JAROSLAU, yä'rō-slou', Austria, town in Galicia, 17 miles northwest of Przemysl, on the river San, and on the railroad between Lemberg and Cracow. It is a garrison town, has manufactures of textiles, pottery and brandy, and is an active trading centre. In the European War the town was twice taken by the Russians in the operations around Przemysl. Pop. 24,974.

JARRATT, Devereux, American colonial clergyman: b. New Kent County, Va., 6 Jan. (O.S.) 1732–33; d. Bath, Va., 29 Jan. 1801. He was largely a self-educated man. In 1762 he went to England in order to enter the ministry of the Established Church and receive orders. On his return he began his long service of nearly 30 years at Bath, Va. In the beginning of the Methodist movement in America he was very friendly with the leaders, especially Bishop Asbury, who makes frequent mention of him in his 'Journal.' He published 'Sermons on various and important subjects in practical Divinity' (3 vols., 1795). His 'Autobiography' appeared in 1806.

JARRIC, zhär'rēk, **Louis Etienne,** CHEVALIER DE, West Indian revolutionist: b. Aux Cayes, Haiti, 1757; d. there, 21 Feb. 1791. He was a mulatto, the natural son of a wealthy creole nobleman and had no claim to the title he assumed, but was well educated and possessed of means. He served as a captain in the French Revolution and was member of the Assembly in 1789. He organized a society "Amis des Noirs" (Friends of the Blacks) with the purpose of securing equal recognition with the whites. Failing to gain his purpose he engaged with Oge in an armed revolution in San Domingo in October 1790, their forces were defeated and Jarric was captured and put to death by torture.

JARROW-ON-TYNE, England, municipal borough in Durham, on the estuary of the Tyne, about six miles east of Newcastle, and on a branch of the Northeastern Railway. The parish church of Saint Paul was built in 685 and still shows much pre-Norman work, although the tower is Norman. The Benedictine monastery was founded in 681 and was the abode of the Venerable Bede. The town was of little commercial importance until the establishment there of large shipbuilding yards and marine-engine works. There are also iron foundries, gun factories, chemical works and paper mills, and there are large exports of coal. The town was incorporated in 1875. Pop. 33,726.

JARVES, jär'vēs, **James Jackson,** American art writer: b. Boston, Mass., 20 Aug. 1818; d. Tarasp, Switzerland, 28 June 1888. In 1838, he sailed for the Sandwich Islands and resided for several years in Honolulu where he published the first newspaper ever printed there, the *Polynesian.* Before returning to the United States he traveled in California, Mexico and Central America, and subsequently published a 'History of the Hawaiian or Sandwich Islands' (1843); 'Scenes and Scenery of the Sandwich Islands' (1844), and 'Scenes and Scenery in California' (1844). He afterward resided in Europe, was United States vice-consul at Florence 1879–82, and engaged in making a collection of old masters the largest part of which, consisting of early Italian masters, eventually became the property of Yale University. Another collection, of Venetian glass, is now at the Metropolitan Museum, New York. For his services to Italian art he was made a chevalier of the Crown of Italy. His later works include 'Parisian Sights and French Principles' (1855–56); 'Art Hints' (1855); Italian Sights and Papal Principles' (1856); 'Kiana, a Tradition of Hawaii' (1857); 'Confessions of an Inquirer' (1857); 'The Art Idea' (1864); 'Art Studies: The Old Masters of Italy' (1861); 'Glimpses at the Art of Japan' (1876); 'Italian Rambles' (1884). Consult Bunner, A. C., 'The Jarves Collection of Italian Pictures in the Galleries of the Yale Art School' (in *Scribner's Magazine,* Vol. LII, p. 253, New York 1912); Sirèn, O., 'A Descriptive Catalogue of the Pictures in the Jarves Collection belonging to Yale University' (New Haven 1916).

JARVIS, Edward, American physician: b. Concord, Mass., 9 Jan. 1803; d. Dorchester, Mass., 31 Oct. 1884. He was graduated at Harvard in 1826 and at the Harvard Medical School in 1830. He engaged in practice at Northfield and Concord, Mass., Louisville, Ky., and after 1842 at Dorchester, Mass. He made a sanitary survey of Massachusetts under orders of the government in 1855, and in 1860 was appointed by the Secretary of the Interior to tabulate the mortality statistics of the United States census of that year. He was president of the American Statistical Association from 1852 until his death. Author of numerous medical reports and 'Practical Physiology' (1848); 'Primary Physiology for the Schools' (1849).

JARVIS, John Wesley, American portrait painter: b. South Shields, England, 1780; d. New York, 1834. He was a nephew of the great John Wesley and was sent to Philadelphia at the age of five. He was principally self-taught, and settled in New York where his portrait work early gained recognition. He studied anatomy and phrenology in their relation to art, and he was especially successful in securing a characteristic likeness. His sitters included Gen. Andrew Jackson, Gov. Dewitt Clinton, Fitz-Greene Halleck, Bishop Benjamin Moore, John Randolph and many

other prominent persons. He was a man of erratic temperament and convivial habits and his mode of life eventually injured his work. His wit and eccentricities were famous and his popularity enabled him to live extravagantly for a time, but he eventually died in poverty. Two of his portraits are in the Metropolitan Museum, New York, and others are in the city hall and in the collection of the New York Historical Society. Both Sully and Inman studied under him.

JARVIS, Samuel Farmer, American Protestant Episcopal clergyman: b. Middletown, Conn., 20 Jan. 1786; d. there, 26 March 1851. He was graduated at Yale in 1805, ordained in 1811, and was appointed rector of Saint Michael's Church, Bloomingdale, N. Y. In 1813 he became rector of Saint James' Church, New York and retained both charges until 1819 when he became professor of biblical learning at the General Theological Seminary. In 1820–26 he was rector of Saint Paul's, Boston, and afterward spent nine years in Europe in the study of church history. He was professor of Oriental literature at Washington (now Trinity) College, in 1835–37, and in 1837–42 he was rector of Christ Church, Middletown, Conn. He was appointed historiographer of the Episcopal Church of America in 1838, and after 1842 devoted himself to literature. He was one of the editors of the *Gospel Advocate* in 1821–26. Author of 'A Discourse on the Religion of the Indian Tribes of North America' (1820); 'A Chronological Introduction to the History of the Church' (1844); 'The Church of the Redeemer' (Vol. I, 1850), etc.

JASHER, jā'sher, **Book of,** a lost book of the Hebrew Scriptures, twice mentioned in the Bible (Josh. x, 13, and 2 Sam. i, 18), and about which various conjectures have been made. It was most probably a national song book of post-Solomonic age whose concerts were partly secular, partly religious. From the mention of the book in Joshua and 2 Samuel it has been inferred that the book of Jasher could not have been written before the time of David's lamentation. But this assumes that the book of Jasher was all written at once, an assumption which in our ignorance regarding it we are not at liberty to make; for the book of Jasher may have been written at different times. The theory of Dr. Donaldson as to its scope and contents, in conformity with which he proceeded to reconstruct it from the fragments which he thought he could trace throughout the several books of the Old Testament, has met with little favor either from English or Continental scholars. Consult Donaldson, 'Fragmenta Archetypa Carminum Hebraicorum in Masorethico Veteris Testamenti Textu passim tessellata.'

JASMIN, zhás'măn', **Jacques Boé,** Provençal poet: b. 6 March 1798; d. 4 Oct. 1864. Of humble parentage, he became a wig-maker; but devoted all his leisure to reading and study. From his father he inherited a talent for the composition of poems and songs in the Provençal tongue. His local poems, especially those composed for the carnival and the country fairs, became quite popular. In 1825 he published 'Lou Chalibary,' a mock-heroic poem which found readers throughout the langue d'oc country. 'Lou Tres de May' (1830), an ode of great power and beauty, made him famous throughout France and Provençal Spain. Then followed poems relating to the humble life from which he had sprung and filled with remembrances of the joys and sorrows of his childhood days, and like the minstrels of olden time he went about from village and town to village and town reciting his poems. 'Las Papillotos' (1835) contained the best of his poems up to that date. Other collections followed in 1842, 1851 and 1863. He was hailed by the Paris critics as a great poet. Of his longer poems, the best known, most popular and of greatest merit is 'Françounetto' (1842), a dramatic and touching story of thwarted love, in which village superstitions and prejudices are painted in a most vivid and realistic manner. Literary honors were showered upon him not only in the Provençal country but throughout France. Among those who publicly recognized his genius were Louis-Philippe and the Duchesse d'Orléans. His poetical recitations brought out more people than the theatres and he was in demand everywhere for the inauguration of societies, the consecration of churches and similar functions; and always the funds taken in at these functions were devoted to charitable purposes.

JASMINE, or **JESSAMINE,** a genus (*Jasminum*) of beautiful plants of the olive family, including many cultivated species and varieties. Most of these are shrubs with long slender branches bearing usually compound leaves and panicles of fragrant white or yellow flowers. They are natives principally of the East Indies. The common jasmine (*J. officinale*) has become naturalized in the south of Europe, where it grows 8 or 10 feet tall, and is practically an evergreen. The oil of jasmine is obtained from *J. officinale* and *J. grandiflorum*, but it is usually imitated or adulterated. *J. sambac* also furnishes an oil in the East. A very common greenhouse species is *J. humile*.

Several shrubs are called jasmines which are not closely related to the true jasmine. Thus the red jasmine of the West Indies (*Plumeria rubra*), the source of the perfume frangipanni, is of the oleander family; the Chile jasmine (*Mandevillea suavolens*), is another fragrant species of the same family, widely cultivated, and others might be mentioned. Two of these outside "jasmines" are familiar in the United States, one of which is a native. The Cape jasmine (*Gardenia florida*) is a Chinese shrub of the madder family, which found its way to England and America about the middle of the 18th century; a double-flowered variety is sometimes grown in greenhouses and it grows out of doors along the southern seaboard, it being the special pride of Charleston, S. C., after one of whose citizens the genus *Gardenia* was named by Linnæus.

The native species is the Carolina or yellow jasmine (*Gelsemium sempervirens*), an exceedingly odorous climbing plant of the family *Loganiaceæ*, common throughout the South Atlantic States. It is a vine, whose blossoms grow in axillary racemes of from one to six vivid yellow tubular flowers; and "evening trumpet-flower" is a common name. "Early laden, indeed, is the warm air of spring with its delicious perfume. . . . Through woods and thickets it wends its way vigorously and gleams

as brightly as does later the Cherokee rose. It is one of the joys of the season.» The roots are regarded by the country people as possessed of medical virtues.

JASON, a Jewish high priest in 174–71 B.C. He was the second son of Simon II and a brother of Onias III, whom he succeeded in the high priesthood. He is stated by Josephus (Ant. xii, 5, 1) to have changed his name to Jason from Jesus, and he is said to have paid a large sum for his appointment as high priest. While Onias was answering the charges of the Hellenists, Jason is supposed to have joined forces with them. He secured permission to build at Jerusalem a gymnasium and an ephebum, and by payment of a further sum gained for the people of Jerusalem the title and privileges of citizens of Antioch. He furthered by all means in his power the spread of Hellenism and sent competitors, and a large sum of money for a sacrifice to Hercules, to the Olympian games at Tyre. He was succeeded by Menelaus in 171 B.C., but in the absence of Antiochus Epiphanes in a campaign against Egypt in 170 B.C., he rallied the people to his aid and forced Menelaus to take refuge in a fortress. His seizure of power was soon followed by the return of Antiochus who took the city, and Jason in his turn was expelled. He took refuge with the Ammonites and finally with the Lacedæmonians, among whom he died. Consult 2 Maccabees iv, 7–26; Josephus, 'Antioch' (xii, 5); Stanley, 'Lectures on the History of the Jewish Church' (iii, 324); 'Wellhausen, 'Israelitische und Jüdische Geschichte' (2d ed., p. 235, Berlin 1895).

JASON, in Greek legend, the son of Æson, king of Iolcos in Thessaly, a hero of ancient Greece, celebrated for his share in the Argonautic expedition, before which he had distinguished himself in the Calydonian hunt. He belonged to the family of the Æolidæ at Iolcos, and his instructor was the centaur Chiron, who educated most of the heroes of that time. (For his adventures in the Argonautic expedition see ARGONAUTS). On his return to Iolcos with Medea as his wife he avenged the murder of his parents and his brother by putting Pelias to death. But he was unable to retain possession of the throne, and was obliged to resign it to Acastus, son of Pelias, and flee with his wife to Corinth. Here they passed 10 years, till Jason, wearied of Medea, fell in love with Glauce (Creusa, according to some accounts), daughter of Creon, king of Corinth, married her and put away Medea and her children. Medea, having revenged herself on her hated rival, fled from the wrath of Jason in her car drawn by winged dragons, the gift of Helios, to Ægeus, king of Athens, after she had put to death Mermerus and Pheres, her sons by Jason. According to some Jason killed himself from grief; but others relate that, after passing a miserable wandering life, he came to his death by accident. Others say that he was reconciled to Medea and returned with her to Colchis, where he ruled many years.

JASON OF CYRENE, a Hellenistic Jew whose history of the times of the Maccabees, written originally in five books now lost, is embodied in 2 Maccabees, refererice to the original historian being made in 2 Maccabees ii, 19–32. Nothing is known of Jason except the references to him in 2 Maccabees.

JASONVILLE, Ind., village of Greene County, 25 miles southeast of Terre Haute, on the Chicago, Terre Haute and Southeastern Railroad. It has rich deposits of coal. Pop. 3,295.

JASPER, William, American soldier: b. South Carolina, about 1750; d. Savannah, Ga., 9 Oct. 1779. At the commencement of the Revolutionary War he enlisted in the 2d South Carolina regiment, in which he became a sergeant. Subsequently, in the attack upon Fort Moultrie by a British fleet, he distinguished himself by leaping through an embrasure to the ground, under a shower of cannon balls, and recovering the flag of South Carolina, which had been shot off. Governor Rutledge presented him with his own sword and offered him a lieutenant's commission; this, however, Jasper declined, saying: «I am not fit to keep officers' company; I am but a sergeant.» His commander gave him a roving commission to scour the country with a few men and surprise and capture the enemy's outposts. His achievements in this capacity seem to belong to romance rather than history and in boldness equal any recorded in the Revolutionary annals of the Southern States. Prominent among them was the rescue by himself and a single comrade of some American captives from a party of British soldiers, whom he overpowered and made prisoners. At the assault upon Savannah he received his death wound while fastening to the parapet the standard which had been presented to his regiment. His hold, however, never relaxed, and he bore the colors to a place of safety before he died. A county of Georgia and a square in Savannah have been named after him. Consult McGrady, 'South Carolina in the Revolution' (1901).

JASPER, Ala., village and county-seat of Walker County, 35 miles northwest of Birmingham, on the Alabama Central, the Saint Louis and San Francisco, the Illinois Central and Northern Alabama railroads. It is situated in an important coal and cotton district. Pop. 2,509.

JASPER, Ind., town, county-seat of Dubois County, on the Patoka River, and on a branch of the Louisville, Evansville and Saint Louis Railroad, about 47 miles northeast of Evansville. Jasper is situated in an agricultural region. The chief manufacturing establishments are saw-mills, lumbering and planing-mills, flour-mills, a furniture factory and a brickyard. Pop. 2,196.

JASPER, an impure quartz, less hard than flint or even than common quartz, but which gives fire with steel. It is entirely opaque, or sometimes feebly translucent at the edges, and presents almost every variety of color. It is found in metamorphic rocks and often occurs in very large masses. It admits of an elegant polish and is used for vases, seals, snuff-boxes, etc. There are several varieties, as red, brown, blackish, bluish, Egyptian. Ribbon or agate jasper is jasper in layers.

JASPER WARE, a white terra cotta or porcelain bisque invented by Josiah Wedgwood and used for the delicate reliefs in his cameo ware. It is also used for jewelry settings and statuettes. See WEDGWOOD WARE.

JASPILITE, a compact siliceous rock similar to jasper in appearance. Its occurrence in the Lake Superior region is of economic importance as it appears invariably above the ore-bearing formation.

JASSY, yäs'sĕ, Rumania, the former capital of Moldavia, on the Bahluiu River. There is a university with 900 students; the industrial enterprises are few; but the commerce is extensive and important. The chief exports are petroleum, grain, meat and salt; the chief imports are coal and clothing. A treaty between Russia and Turkey was concluded here in 1792. It was in Jassy, in 1821, that Alexander Ypsilanti really began the work for Greek independence. About one-half the population are Jews. Pop. 75,882, about 33 per cent being Jews.

JASTROW, yäs'trō, **Ignaz,** German economist and historian: b. Nakel, 13 Sept. 1856. He was educated at Breslau, Berlin and Göttingen, and in 1885 was appointed privat-docent of social economy at the University of Berlin. He visited the United States in 1904 and since 1905 has been professor of administrative science at Berlin. He edited the *Jahresberichte der Geschichtswissenschaft* in 1888–91; the *Sociale Praxis* in 1895–97; since 1896 he has edited *Das Gewerbegericht,* and since 1897 *Der Arbeitsmarkt.* Author of 'Geschichte des deutschen Einheitstraumes und seiner Erfüllung' (1884; 4th ed., 1891); 'Die Volkszahl Deutscher Städte am Ende des Mittelalters und zu Beginn der Neuzeit' (1886); 'Das interesse des Kaufmannsstandes am Bürgerlichen Gesetzbuch' (1890); 'Bürgertum und Staatsverwaltung' (1907); 'Cedächtnisrede auf Dunker' (1911); 'Arbeiterschutz' (1912); 'Geld und Kredit' (1914), etc.

JASTROW, jăs'trō, **Joseph,** American psychologist: b. Warsaw, Poland, 30 Jan. 1863. He is a son of Rabbi Jastrow (q.v.) and came to America in childhood. He was graduated from the University of Pennsylvania in 1882 and has been since 1888 professor of psychology at the University of Wisconsin. He became president of the American Psychological Association in 1900. In 1893 he was head of the psychological section at the World's Columbian Exposition. He contributed to the *Psychological Review,* of which he was associate editor and to other scientific and popular magazines. He is editor of 'The Conduct of Mind Series' and has published 'Time-Relations of Mental Phenomena' (1890); 'Epitomes of Three Sciences' (1890); 'Fact and Fable in Psychology' (1900); 'The Subconscious' (1906); 'The Qualities of Men' (1910); 'Character and Temperament' (1915).

JASTROW, Marcus M., American rabbi and lexicographer: b. Rogasen, Posen, 1829; d. Germantown, Pa., 13 Oct. 1903. After the usual rabbinic and academic studies he was graduated from the University of Halle in 1854, became a barber in Berlin and then rabbi at Warsaw. After five years he was obliged to leave by reason of his political opinions, after being subjected to arrest. He was rabbi in Baden 1859–63, at Worms 1863–66, whence he was called to the Congregation Rodef Sholen, Philadelphia, with which he was connected until his death, within recent years (1892–1903) as rabbi *emeritus.* Besides some monographs and contributions to the press, he is best known for his 'Dictionary of the Targumim, the Talmud Babli and Yerushalmi, and the Midrashic Literature' (16 parts, 1904), a monument of untiring erudition and broad scholarship. He edited the Talmudic department of the 'Jewish Encyclopædia.'

JASTROW, Morris, Jr., American Orientalist: b. Warsaw, Poland, 13 Aug. 1861. He was a son of the preceding and coming to Philadelphia with his parents in early childhood (1866), he was trained in the schools of that city, was graduated from the University of Pennsylvania in 1881, and from the University of Leipzig 1884, receiving the degree of Ph.D., after which he spent another year in the study of Semitic languages at the Sorbonne, the Collège de France and the Ecole des Langues Orientales Levant Vivantes. He had intended to devote himself to the Jewish ministry, carrying on for this purpose theological studies at the Jewish Seminary of Breslau (Germany) while pursuing the study of Semitic languages at German universities. On his return to the United States in 1885 he was appointed assistant to his father in Philadelphia, which position he voluntarily resigned after one year, in order to devote himself entirely to linguistic and archæological studies. He gradually extended his field to include the history of religions. He has been connected with the University of Pennsylvania since 1885, first as instructor in Semitic languages and afterward, in 1891, appointed to the chair of Semitic languages which position he still holds. In 1888 he was made assistant librarian of the university, and in 1898 librarian-in-chief. His published works are 'Religion of the Assyrians and Babylonians' (1898); 'Two Grammatical Treatises of Abu Zakariyya Hayyug' (1897); 'A Fragment of the Babylonian Dibbarra Epic' (1891); 'The Study of Religion' (1901); 'Aspects of Religious Practice and Belief among the Babylonians and Assyrians' (1911); 'Die Religion Babyloniens und Assyriens' (3 vols., 1905–12), an enlarged and entirely rewritten German edition of the English work above, together with a separate volume of illustrations bearing on the religion of the Babylonians and Assyrians; 'Bildermappe zur Religion Babyloniens und Assyriens' (1912); 'Hebrew and Babylonian Traditions' (1914); 'Babylonian-Assyrian Birth Omens and Their Cultural Significance' (1914); and 'The Civilization of Babylonia and Assyria' (1915). In collaboration with his wife (Helen Bachman Jastrow) he edited an English translation of 'Selected Essays of James Darmesteter' (1895), the translation from the French being made by Mrs. Jastrow, and he adding a memoir of Darmesteter. In addition to the above he has published a large number of papers on Assyriological, Biblical and Hebrew topics, as well as articles dealing with the history of religions and with archæological problems in the periodicals of learned societies of America and Europe and in technical periodicals of various parts of the world. He has also been a contributor to various Bible dictionaries, to the 'Jewish Encyclopedia,' 'Encyclopedia Britannica,' 'International Encyclopedia,' to 'Webster's Dictionary,' etc. A bibliography of his books, monographs and papers, covering the years 1885–1916, was compiled and published (for private circulation) by Profs. A. T. Clay and J. A. Montgomery.

JÁSZBERÉNY, yäs-bĕ-rān-y, Hungary, town of the District of Jász-Nagykun Szolnok, on the Zagyva, 40 miles east of Budapest. It is situated in an agricultural district and has a trade in grain and livestock. There is an agricultural school, a museum and an interesting Franciscan cloister. Pop. 29,675.

JATAKA, jä'ṭa-ka, a collection of 547 stories of the different births of Buddha, known to have been in existence as early as 380 B.C. The book is written in the Pali language and forms a part of the Buddhist sacred canon. It is evident that the identification of Buddha with the heroes of the fables and stories current in India began soon after his death. The leading character in each fable was made a Bodhisatta, one who is destined through rebirths to become a Buddha, and the stories deal with the "ten perfections," generosity, goodness, renunciation, wisdom, energy, patience, truthfulness, resolution, kindness and equanimity. The existence of the Jataka stories in the original Pali text forms a valuable contribution to the knowledge of folklore, as its antiquity insures its freedom from Western influences or coloring. On the other hand, various versions found their way through Sanskrit and Old Persian into European literature and form the basis of many Western fairy tales and fables, among them those of Æsop. Bas-reliefs illustrating the Jatakas were in existence as early as the middle of the 3d century B.C. The Jataka was translated into English under the direction of E. B. Cowell assisted by Chalmers, Rouse, Francis and Neil (7 vols., Cambridge 1895–1913). An earlier edition of the Jataka in the Pali text was edited by Fausböll (7 vols., London 1879–97). The introduction to the old Jataka book in the original Pali gives a life of Buddha which was translated into English by T. W. Rhys Davids (London 1880). Consult Kern, H., 'Jātaka-māla,' Sanskrit text (Cambridge, Mass., 1891; Eng. trans., Speyer, J. S., Oxford, 1895); 'Buddhist India' (chap. XI, London 1903); Kuhn, E., 'Barlaam und Joasaph' (Munich 1893); Cunningham, A., 'The Stūpa of Barhut' (London 1879).

JATROPHA, jăt'rō-fa, a genus of euphorbiaceous plants of the tribe *Crotoneæ,* tropical and chiefly American. They are of interest principally for their medicinal properties, which reside mostly in the seeds. These, in the case of *Jatropha curcas,* are called Barbados or physic nuts,—the last in allusion to their purgative power. The so-called jathropha-oil is extracted from the seeds of the coral-plant (*J. multifida*) and of the East Indian *J. glauca,* and is used externally as a stimulant. A common species in the southern United States is the spurge-nettle or tread-softly (*J. stimulosa*). See MANIHOT.

JATS, jâts, the most numerous of the agricultural population of the Punjab, India, numbering about four and a half millions. They are by many identified with the *Getæ;* and some of the best authorities accept the theory that they are descended from Scythian invaders of India in prehistoric times. Some scholars believe them cognate with the Gypsies (q.v.). Their religion is Mohammedan. They are tall, light brown in coloring, with long faces, high forehead and clean-cut features. Consult Risley, H., 'The People of India' (Calcutta 1908).

JAUNDICE, jän'- or jân'dis, a morbid condition arising from the circulation of bile in the blood, with consequent staining of the tissues and a peculiar train of symptoms resulting from the poisoning. The tint of the skin and certain mucous membranes varies from a light yellow to a brownish or saffron hue. Staining of the conjunctiva is first observed, and is most intense. Jaundice, with reference to its origin, may be either obstructive or toxic. The term obstructive means causing a hindrance to the outflow of the bile from the gall-ducts into the intestine, with its consequent absorption into the hepatic vein and general circulation. Not only is the skin stained, but all the secretions as well, the urine becoming dark brown. As no bile is thrown into the intestine, the stools become clay-colored and usually hard. There is frequently distressing cutaneous itching, and other skin-maladies are not uncommon. The blood partially loses its power of coagulation, and the vessels are apt to allow the escape of blood into the tissues, giving rise to purpuric spots. The pulse is usually slow, and the patient somewhat melancholic. In bad cases death may follow a period of convulsions, delirium or coma. The cause of this obstruction may be anything occluding the lumen of the ducts from within as catarrh of the membrane of the intestine, where the bile-ducts open, or catarrh anywhere along the course of the ducts; stones or thickened bile may block up some part of the tubes, or they may be occluded from pressure on the outside by tumors, constricting bands or shrinking of the liver-substance. (See LIVER, DISEASES OF THE). The toxic form of jaundice is due to the circulation of poisons in the blood which break down the red cells or, more rarely, destroy the liver cells. The jaundice in this form is not so intense, and the other symptoms caused by the poison are of more importance. Many of the infectious diseases, such as influenza, typhoid fever, yellow fever, pneumonia, pyæmia and acute atrophy of the liver, cause this form. Mineral poisons, particularly phosphorus, act in the same way. Jaundice in the new-born is so common as to be considered a natural condition, and usually lasts but a few days. It is evident from the many conditions that may give rise to jaundice that it must be considered as a symptom, and treatment should be directed to aiding the bodily functions until the exact cause can be determined.

JAUNPUR, jown-poor, British India, city in the district of the same name in the Benares division, on the river Gumti, 34 miles by rail northwest of Benares. It is a city of great antiquity and was formerly the capital of a Mohammedan kingdom extending from Budaun and Etawah to Behar. It has many fine architectural monuments, among them a gateway of the 16th century, a mosque dating from 1376, the baths of Ibrahim Shah, the bridge over the Gumti, built in 1569–73, and other splendid remains. The city was a centre of revolt during the Indian mutiny in 1857. While it is famous for its perfumes it is no longer commercially important. Pop. 30,473.

JÁUREQUI Y AGUILAR, hou'ra-gē ē ä'gē-lär, **Juan Martínez de,** Spanish poet: baptized Seville, 24 Nov. 1583; d. Madrid, 11 Jan. 1641. He studied at Rome and in 1610 is known to have been in Spain with a reputation

as both painter and poet. He is supposed to have painted the portrait of Cervantes mentioned in the prologue to 'novelas exemplares,' which is believed to be the one now in the possession of the Real Academia Española; and his translation of Tasso's 'Aminto' (Rome 1607) is praised in the second volume of 'Don Quixote.' His 'Rimas' (1618) comprised a collection of charming lyrics, and in its preface the poet severely scored the affectations of the school of Góngora. He was appointed groom of the chamber to Philip IV through the influence of Olivares, and afterward won the Order of Calatrava through his spirited presentment of his views of the art of poetry in 'Discurso poético contra el hablar culto y oscuro' (1624). Later, however, Jáurequi fell under the influences he had so strenuously combated, his 'Orfeo' (1624) showing evidences of the Góngora cult, while his translation of the 'Pharsalia,' published posthumously (1684), shows him a full convert to the method. His reputation rests upon his earlier work. An edition of his poems was published in 'Biblioteca de autores españoles' (Vol. XLII, Madrid 1857). His translation of the 'Aminto' was edited by Lopez de Sedano in 'Parnaso español' (Vol. II, Madrid 1768–78).

JAURÉS, Jean Leon, zhŏn lā-ôn zhō-rā, French Socialist: b. Castres, 3 Sept. 1859; d. Paris, 31 July 1914. He taught in Albi and Toulouse, and in 1885 entered politics and was elected to the Chamber of Deputies from Tarn; at this time he was a moderate Republican. In 1889 he failed of re-election, and returned to Toulouse, where he was active in the establishing of a college of medicine. Becoming a Socialist, he defended the strikers at Carmaux, and in 1893 was again elected to the Chamber, where he became one of the leaders of the Socialists. He failed of re-election in 1898, but was again elected in 1902. When the Socialist Millerand accepted a position in the Cabinet, Jaurés defended his action, thus opposing Guesde and the *Parti Ouvrier*, but sought at the same time to reconcile the factions. He also took an important part in obtaining a revision of the Dreyfus case. He stood out as a champion of the workmen in the great strike of 1910. At a Socialist conference in Brussels in the summer of 1914 he made a strong attack on militarism, and declared himself in favor of an international strike for the prevention of war — an attitude which subjected him to severe criticism, and was directly the cause of his assassination by shooting at the hands of a half-demented man outside a café in Paris. He was one of the greatest leaders of French Socialism, and probably the greatest orator in the Chamber of Deputies. He founded *L'Humanité* in 1904, and contributed six of the 12 volumes of the 'Histoire Socialiste' (1904–08).

JAVA, jä'va (native, *Siti-Java* or *Yava*, land of millet), an island of Dutch East India; situated between lat. 5° 52′ (Saint Nicholas Point), and 8° 50′ (South Cape) S.; and long. 105° 13′ and 114° 39′ E. The island is bounded on the north by the Java Sea, on the east by Bali Strait, which separates Java from Bali Island, on the south by the Indian Ocean and on the west by Sunda Strait which separates the island from Sumatra. It extends east and west, declining 15° toward the south. It is about 660 miles long, from 40 to 125 miles wide, and the area is about 48,686 square miles. The Indian Ocean, which beats with great force along the south coast, has prevented the formation, on that side, of such alluvial plains as extend along the north coast. From the same cause the south coast is generally unsafe for shipping, while the north affords excellent anchorage at almost all times and places. The south presents a continuous front of crags and rocks, forming the outer edge of an extremely mountainous country; the north is flat and low, and covered in many places with mangrove swamps. The chief harbors on the north are those of Surabaya and Batavia; on the south that of Chilatjap, formed by the small island Kambangan.

Topography and Hydrography.—The whole configuration of the island has been transformed by volcanic action. There are at least 45 volcanoes in Java, of which half are active. In the western end of the island they are grouped in a mass and attain a height of 10,000 feet, but in the eastern portion, though more scattered, they are generally higher, one, Semeru, 12,044 feet, being the highest in the island. Among the chief are Salak (7,266), near Batavia, now extinct; Gedé (9,720); Tjirmaj (10,075); Marbabu (10,670); Raun (10,820); Slamar (11,250). Papandayang, in the southwest, destroyed about 3,000 persons in 1772. In 1822 great damage was done by the eruption of Galungung, one of the volcanoes in the western part of the island. In 1686, about 10,000 lives were lost by the eruption of Ringghit, once over 12,000 feet high, but now a low mountain. The eruption of Kloet (q.v.), in 1901, was most disastrous. The eruption of Krakatoa (q.v.) in 1883, was one of the horrors of modern times.

The island is subject to earthquakes, usually not severe. Three earthquakes are known to have preceded and 19 accompanied volcanic eruptions. In 1867 occurred a most destructive earthquake. A low range of non-volcanic hills, about 3,000 feet high, extends along the south coast. The crater of an extinct volcano called Guwa Upas, or the Vale of Poison, about one-half mile round, is held in horror by the natives. It is said that every living creature that enters it drops dead, and the soil is covered with the carcasses of deer, birds, and even the bones of men, killed by the carbonic acid gas which lies in the bottom of the valley; but its terrors have been much exaggerated. "In another crater in this land of wonders," says Sir Charles Lyell, "the sulphurous exhalations have killed tigers, birds and innumerable insects; and the soft parts of these animals, such as the fibres, muscles, hair, etc., are very well preserved, while the bones are corroded or entirely destroyed." Numerous rivers flow from the north and south sides of the mountains, carrying fertility with them, and affording supplies to innumerable artificial water-courses used in irrigation. These streams are generally rapid, shallow and so encumbered with sandbanks as not to be navigable; so that only two rivers, the Solo and the river of Surabaya, are navigable for large boats; the others are only suitable for proas or canoes of the lightest draught, or for floating down timber from the mountains. The Tji Tarun and the Tji Manuk are navigable a part of the year.

Climate.— Java is considered fairly healthy, but proper care must be taken to avoid the excessive heat of midday and the night air from the marshes. The temperature of the plains and valleys is during the day from 85° to 94° F., and during the night from 73° to 80°. The mean temperature at Batavia is 78.69° F. At an elevation of 6,000 feet the thermometer descends to 60°, while the tops of the highest peaks are often covered with ice but no snow falls. The breezes from the water modify the temperature. There are two seasons; the dry from April to October, and the rainy season from October to April. During the rainy season there is an almost continuous rainfall except for a short time in the morning. The annual rainfall is about 80 inches. The island is not subject to storms which injure life or property, but near the high mountains there are frequent thunder storms.

Geology.— Java is formed mainly of tertiary, though partly of post-tertiary strata; but by volcanic action the arrangement has been much disturbed. Rocks containing fossil invertebrates are common, but the fossils of vertebrates have not been discovered. There are no metallic veins of sufficient length or depth to be profitable for mining; the Bantam coalmines, in the northwestern part of the island, yield only lignite; sulphur, naphtha and asphalt are found in several places, and small quantities of salt, saltpeter and magnese. Limestone and marble are in the southern part. Its minerals, with the exception of tin, are not considered of sufficient value to be classed among its natural wealth-producing resources.

Vegetation.— With a temperature ranging from 94° to the freezing-point, a volcanic soil plenteously watered naturally and artificially, it is not surprising that Java should be of astonishing fertility; the range of its vegetation naturally follows that of its temperature, from the palms of the tropics to the mosses of the temperate zone. The coast is fringed with coconut trees; behind them the ground rises gently to the foot of the mountain chain, and is completely cultivated. Vast fields of rice, artificially watered, distributed amphitheatrewise on the flanks of the hills, yield often three harvests annually. In the same altitude are found the cotton plant, the mangoes, sugar-cane, indigo, palm-trees and other tropical vegetation. Higher up than the rice-fields the bases of the mountains are covered with vast forests of the fig-tree tribe of different species, remarkable for their great height and vigorous growth. Tea, coffee, fruits, cinchona, sandalwood, mahogany, camphor, bamboo, rattan and many other forms of vegetation are found in this altitude of from 2,000 to 4,000 feet. These are followed still higher up by the plane-like liquidambars, with their erect stems covered with parasites, also rattans and *Rubiaceæ*, the latter of numerous species, some of them exhaling a very fœtid odor. Along the upper limits of the liquidambers, about 4,000 feet above the sea, lofty trees are still plentiful; here may be seen *Podocarpus cupressus*, with its lofty straight stem, a tree allied to the yew, and furnishing the best timber in Java; the Dammar pine, rhododendrons, laurels of numerous species, chestnuts, oaks and several others, magnolias, myrtles, tobacco, maize, potatoes and other vegetation common to the temperate zones. About 7,000 feet high the vegetation changes its aspect, and mosses appear, which, with heaths, are the principal plants found on the loftier elevations. Before leaving the natural vegetation the famed poison-tree, the chettik or upas (*Antiaris toxicaria*), may be named as a noted Japanese plant. The vast forests likewise claim notice; they are 791 in number, and cover a very extensive surface in 13 of the provinces, and consist mainly of teak. To prevent the waste which was going on, the government has placed them under superintendence, and draws from them a large amount of revenue.

Animals.— Including domestic and marine animals 100 kinds of mammalia inhabit Java. In the west part the one-horned rhinoceros is not uncommon; and in the higher districts the royal tiger, panther and tiger-cat keep the inhabitants in constant alarm by their depredations. The babiroussa and two kinds of wild hog form the large game of the island. There are only two species of the ape kind, but they people the forests in countless numbers. Two kinds of lemurs inspire the inhabitants with superstitious fear by their mysterious nocturnal habits; and this island may be esteemed the native seat of the largest bats, some of which measure five feet across the wings. They may be seen suspended from the branches in hundreds during the day, and at night they devastate the orchards and gardens. Two civets are common and supply a perfume of which the Javanese are passionately fond; the wild ox abounds in the woods; and the buffalo is the only animal used in agricultural labor. The horses are small, but vigorous, and, as in India, are not used for agricultural purposes. Two species of wild dogs and six species of deer are found here. Among the domestic animals are the buffalo, ox, horse, goat and sheep. The ornithology of Java is rich and varied, both in genera and in species. About 300 species of land birds have been found on the island, among them the peacock, partridge, quail, 10 different species of pigeon, 11 species of heron, two of cuckoo, the woodpeckers, the black and crimson oriole, the hornbill, eagle, owl, the brilliant looking and appropriately named minaret flycatcher, the "swift" (q.v.), and the minor bird so apt in learning to mimic human speech is common. Almost all the known generic groups of rapacious birds are found here in great numbers, and gallinaceous fowls are plentiful. A variety of reptiles are found on the island, among them the python. Insects cover the grounds and plants in countless numbers; but few are distinguished for brilliancy or variety of color, or are remarkable in form. Fish are plentiful in the rivers and along the coast; but those of the rivers are of inferior quality for food. Excellent oysters are abundant on the north coast, and prawns, from which a condiment called trasi is prepared, are considered delicious by the natives. Crocodiles from 20 to 30 feet in length inhabit the watercourses.

Occupations and Productions.— The Javanese are almost entirely occupied in agriculture. There is a small class of fishermen on the north coast and a few artisans in the towns, but the great bulk of the people live directly or indirectly by the cultivation of the land, in which they have made greater progress than any other

Asiatic nation except the Chinese and Japanese. The chief crop is rice, of which with the aid of irrigation, industriously and almost universally applied, two crops are raised in a year. Lands that cannot be irrigated are used for growing pulses, oil-giving plants, cotton, sugar-cane and tobacco; and on the mountain slopes, at an elevation of 2,000 or 3,000 feet, coffee is cultivated. "In the most fertile parts of Java," says Crawfurd, "and these from the neighborhood of the high mountains are usually also the most picturesque, the scenery is at once agreeable and magnificent, and certainly for grandeur and beauty excels all that I have seen even in Italy, that country which in summer bears the nearest resemblance to Java. In such situations we have mountains 10,000 feet high, cultivated to half their height, the valleys below having all the appearance of a well-watered garden, in which the fruit trees are so abundant as to conceal the closely packed villages." The mechanic arts among the Javanese are not so far advanced as their agriculture. About 30 crafts are practised among them, of which the principal are those of the blacksmith or cutler, the carpenter, the sheath maker, the coppersmith, the goldsmith and the potter. Bricks and tiles are largely made. The carpenters are skilful in house and boat-building. They make vessels of all sizes from 50 tons down to fishing canoes, and under European superintendence build large ships. The ordinary dwellings of the people are built of a rough frame of timber, thatched with grass or palm leaves and with walls and partitions of split bamboo. The Javanese excel all other nations of the Malay Archipelago in the working of metals. They are especially skilful in the manufacture of the national weapon, the kris or dagger, which is worn by every man and boy above 14 years as part of his ordinary costume, and by many ladies of high rank. They make also excellent gongs of brass, and these with other musical instruments of the same metal have long been exported to the neighboring countries. The only native textile material woven by the Javanese is cotton, of which they make only a stout durable calico, and this is purely a domestic manufacture, carried on exclusively by the women. From raw silk imported from China, the silkworm not being reared in Java, a coarse cloth is woven by the women. Paper of the nature of the ancient papyrus is a manufacture peculiar to the Javanese.

The greater part of the agricultural lands of Java is claimed by the government of the Netherlands and the private estates are principally in the residencies in the western part of the island. The government or the private landowners can enforce one day's gratuitous work out of seven, and in some cases more, from all the laborers on their estates. In 1882 the greater part of the enforced gratuitous labor for the government was abolished in return for the payment of one guilder (40 cents) per head yearly. In 1914 the natives in Java and Madura had under cultivation 9,607,000 acres. Prior to 1891 the government raised sugar; but since 1891 the sugar is all raised on private properties and on lands hired by the natives, or on lands held on emphyteutic tenure from the government. In 1914 the number of sugar factories was 191 and the yield of sugar was 1,363,380 tons. The yield of coffee in Java for 1914 was 8,696 tons; of tea, 29,893,603 kilograms; and of cacoa, 1,186,282 kilos.

Trade and Commerce.— The trade of Java is now large, and what was once a burdensome colony has become one of the principal sources of wealth to Holland. The great bulk of the foreign trade is carried on through the ports of Batavia, Samarang and Surabaya. The principal exports are sugar, coffee, cinchona, indigo, nutmegs, mace, cloves, cinnamon, pepper, tea, rice, copra, cacoa, tapioca, cochineal, cubebs, arrack, tobacco, hides, india rubber and tin. With the exception of rice, about one-half of which goes to Borneo and China, nearly four-fifths of the exports go to the Netherlands. The principal imports are cotton yarns and cloth, machinery, iron, coal and woolen goods.

Education.— The Europeans and the natives have separate schools with a slight difference in their methods of government. Ample provisions are made by the government for the education of the natives. In 1914 there were 834 government schools, with 175,666 enrolments, and 494 private schools, with 50,301 pupils. There is an agricultural college, a museum and a fine botanical garden at Buitenzorg and a gymnasium at Batavia. In science the people have made little progress, possessing only a rude notion of astronomy and a slight knowledge of arithmetic. Their architecture at present day hardly deserves the name, though the country abounds with remarkable remains of temples built many centuries ago by the ancestors of the present inhabitants. Of the other fine arts, music is the one in which they have made the greatest progress. They are passionately fond of it and have generally good taste. Their melodies are wild, plaintive and interesting and more pleasing to the European ear than any other Asiatic music. They have wind and string instruments, but their best and most common instruments are drums and gongs.

Religion.—All religious denominations are allowed perfect freedom in Java. The Javanese are Mohammedans, which faith was established by Arab conquerors in the 15th century and has almost displaced Brahminism and Buddhism, the ancient religions of the country. In 1914, in Java and Madura, there were 30,000 native Christians.

Ethnology.— The native population of Java comprises two distinct nations, the Sundese and the Javanese. The Sundese occupy the western end of the island and are greatly inferior in number to the Javanese and less advanced in civilization. They speak a distinct language. Both nations are of the Malayan race. They are generally about two inches shorter than the men of the Mongolian and Caucasian races, with round faces, wide mouths, high cheek bones, short and small noses and small, black, deep-seated eyes. The complexion is brown with a shade of yellow, and is never black. The hair of the head is thick, black, lank and harsh, and is either scanty or altogether wanting on other parts of the body. A few short, straggling hairs compose the beard. The people are not active and make but poor runners or wrestlers. They are described as a peaceable, docile, sober, simple and industrious people. Mr. Crawfurd, author of 'A Descriptive Dictionary of the Indian Islands,' who lived several years in Java, says: "From my own experience of them, I have no difficulty in pronouncing them the most

straightforward and truthful Asiatic people that I have met. The practice of running amuck, so frequent with the other cultivated nations of the archipelago, is of very rare occurrence with them.» They are patient, enduring and easily led when convinced that the orders given are not contrary to the ancient laws and customs of the country, which are held in religious reverence. They are very susceptible of affronts, which they are not slow to avenge with the kris, which is invariably worn, and they are frequently likewise armed with the sabre or pike. The mass of the Javanese take only one wife, but people of quality and wealth take advantage of the latitude allowed by the Koran and practise polygamy. All, without distinction, are passionately fond of gaming, more especially of cock-fighting.

Population.— Java is one of the most densely peopled countries of the world. The population in 1905 was 28,604,719. The population of the principal towns in Java, January 1905, was:

	Europeans	Natives	Chinese	Arabs	Other Orientals	Total
Batavia	8,777	99,320	28,150	2,058	246	138,551
Surabaya	8,063	124,473	14,843	2,482	237	150,198
Surakarta	1,572	109,524	6,532	337	413	118,378

The whole population of Java is legally divided into Europeans and races assimilated with them, and natives and races assimilated with them. The Europeans and those assimilated with them are generally living under the laws which prevail in Netherlands, while the natives and those assimilated with them observe the customs and laws of India. The division of the population into the two classes mentioned is in accordance with the code which specifies the limits and conditions for legislation in Dutch East India. The governor-general, together with the council, has power to make individual exceptions to the general rule.

Government and Revenue.— The most important feature of Javanese society is the village, which forms a complete body politic, with considerable powers of self-government. Its officers are elected by the people, and are charged with the collection of the taxes and the maintenance of public order. The general government of the island is entrusted to a governor-general, appointed by the king of Holland. He is commander-in-chief of the army and navy and possesses nearly absolute power. Justice is administered to the European inhabitants by a Supreme Court at Batavia, and by three provincial courts at Batavia, Samarang and Surabaya. There are besides these other courts for the Asiatic population. In 1832 Gen. Johannes Graaf Van den Bosch introduced into Java a system of government known as the «culture system.» In principal, it was based upon the officially superintended labor of the natives, directed so as to produce not only a sufficiency of food for themselves, but a large revenue for the Netherlands. This obligatory labor was applied to the culture of coffee, sugar, indigo, pepper, tea, tobacco and some other products; but at present the labor of the natives is required only for the culture of coffee which is marketed by the government. By the terms of a bill which passed the legislature of the Netherlands in 1870, the obligatory cultivation of the sugar-cane is now totally abolished.

Java, including the island of Madura, comprises 17 residencies, each governed by a resident, assisted by assistant residents. and other officials. Before receiving government appointments, these officials must first have had examinations. The resident and his assistants, together with a number of native officials, exercise almost absolute control over the province in charge. The native officials are remunerated for their services by salaries or by a percentage on the amount of taxes collected. No law can be enacted or enforced by any governor-general which will conflict with the «Regulations for the Government of Netherlands India,» laws passed in 1854 by the king and States-General of the Netherlands.

The revenues are derived from the government monopolies of railroads, salt, opium and from the sale of government products obtained under the «culture system.» Other revenues are obtained from taxes on houses and estates, sale of government lands, custom duties, licenses, personal tax and from a number of indirect taxes. The greatest expenditures are for the general administration, about one-third, and for the army and navy another third.

Defense.— The army and navy of Java form a part of the defense of the whole Netherlands India. The army is colonial and the regular army of the Netherlands is not allowed on duty in any part of Dutch East India. The commissioned officers are Europeans, except a few prominent natives to whom honorary offices have been given. One-half the non-commissioned officers must also be Europeans. There is a school attached to every battalion, and a military academy on the island of Java, at Meester Cornelis, a place near Batavia.

History.— Ancient Javanese history is written in the still existing magnificent remains of temples and other public buildings, which are plentifully scattered over the island. Near Solo are the ruins of the temple at Brambanum, which are supposed to date from the 9th century and are eloquent of the magnificence of the Hindu period in Java. At Boro Buddor there is probably the largest Buddhist temple in the world, perched on the summit of a hill, above which it towers to a height of 120 feet, adorned with 998 bas-reliefs illustrating the life of Buddha, while 441 images of Buddha are still in existence. These and similar remains attest that the worship of Brahma and Buddha once prevailed in the island under the Hindu empire of Modjopahit, the dismemberment of which was consummated by the Arabs 1478 A.D., by the destruction of a vast capital of that name. Islamism had previously supplanted the rival faiths and had driven their last adherents into the neighboring island of Bali. The island then fell under the dominion of numerous petty chiefs, and was found in that state by the Portuguese, the first European settlers on the island, who arrived in 1511. They were followed in 1595 by the Dutch, who soon eclipsed them. Though their views were at first directed wholly to commerce, the Dutch merchants, like the British East India Company, soon found it necessary to assume the position of a governing power, and treated accordingly with the native princes, with whom they were frequently at war. In 1811 Java was taken from the Dutch by the British, who, however, restored it after the Peace of 1816, since which time it has

remained in their hands. Up till 1825 various portions of the island were still under native princes, who paid tribute to Holland; but in that year a revolt took place, which resulted in the whole island falling under the Dutch sway; although two provinces have been left, but only nominally, under the government of Javanese princes — Surakarta and Jokjokarta. Both princes have a court, nobles, ministers, etc., but are the mere instruments of the Dutch government, by whom they are allowed handsome pensions. Since the close of this war the island has been rapidly increasing in population and prosperity. On 20 Sept. 1859 the Dutch legislature totally abolished slavery in Java. The natives never had slaves and there never were but a few thousand on the island.

Language and Literature.— It is not certain whether the name of Java be connected with the Sanskrit Javana and Yavana, both of which, besides being related to Ἰωνία as names of Greece, also signify (especially the latter) Bactria, Arabia and other foreign countries, and, moreover, swift, horse, etc.; or whether its etymon be of a different origin. As regards the affinities of the Javanese language, Roorda considers it as a branch of the Malay. Crawfurd derives it from the vernacular of the aborigines, to whom he attributes the primitive culture of the Malayan Islands. Domeny de Rienzi supposes it to have arisen from the language of the Bugis of Celebes, by an admixture of Malay and Sanskrit. Humboldt connects it, both as to words and grammar, with the Tagala, the most developed Malayan tongue of the Philippine Islands, as well as with other Malay idioms and with Sanskrit. Others see in it a type of the unmixed tribes of Oceania. It certainly shows all these affinities and contains also some Arabic elements. The Javanese is the most cultivated of all Polynesian languages, owing to the very early intercourse of the island with the continent of India, whose Aryan as well as Dravidan influence is attested by the presence of Malabaric words along with those from the Sanskrit, not only in Javanese, but also in the idioms of Sumatra, Madagascar, etc. Both religious and political revolutions have served to modify the condition of the languages. There are four dialects, according to Raffles, on the three islands which form the linguistic group in question, namely: (1) The tongue of the mountaineers of Sunda, in the western part of Java, east of Tagal, probably vernacular through this whole region before the introduction of Mohammedanism, now spoken by about one-tenth of the population of the island; it contains many Malay and some Sanskrit words, stands in the same relation to the principal language as the Welsh does to the English and is best spoken at Bantam, sluggishly at Bogor and Chianjore and verging to the Javanese at Cheribon. (2) The Javanese proper, east of the last-named city, extending through the rest of the island, especially along its north shore; its words are long at Tagal, shorter at Samarang, full, short and strong at the courts of Surakarta in the centre and Jokjokarta in the south; it approaches the Madurese at Surabaya and the Balian at Banyu-Vangi. (3) The dialect of Madura and Sumanap, which has many Sunda words, with more of Malay, and with peculiar endings. (4) That of Bali, little different from the general Javanese. This island preserves the ancient letters as well as Brahminism, both expelled from Java in the 15th century. A sort of jargon, analogous to the *lingua franca,* is spoken at Batavia, being a medley of Dutch, Portuguese, Javanese and Malay. Along with the preceding there are also peculiar styles or idioms of speech, varying in accordance with social position and age, as the *madhjo* (intermediate), between equals; the *bása* or *bohoso-ngoko* (language popular), to inferiors; the *bása-kramo* (language superior), urbane, court idiom, about three-fourths of it Sanskrit, used by poets as the speech of gods, heroes and ghosts. As to locality, there are also two vernacular idioms, namely, the *bása-dalam* of the interior and the *bása-luar,* spoken along the shores. The Kavi (learned, wise, poet) is the ancient sacred language of Java and consists of about six parts of Sanskrit, less altered than in the Pali, to four of Javano-Malay. It owes its origin to Brahminic immigration, about the beginning of our era. It is to the Javanese what Sanskrit is to the Hindostanee, and Pali to the Indo-Chinese languages. Declining in the 14th century, it took refuge in Bali and was imperfectly known by the Panambahan at Sumanap at the time when Raffles was in Java. Passages in the Kavi are sometimes quoted on peculiar occasions, as for instance in fables and dramas; the term itself is employed as a title of works, etc., such as *Sekar-kavi,* flowers of poetry, whence *Sekarini,* a Kavi metre; *Rama-kavi,* the Javanese Ramayana; *Kavindhra,* principal singer or poet (named *ma-kathā,* narrator, in Tagala). A few specimens of words may show the relation of the Javanese to the common Malay, where the difference, if not specially noted, is sometimes more in the accent than otherwise: *langit,* heaven; *tanah,* earth (Mal. also *benua,* region); *ayer* (Jav. also *banyu*), water; *laut* (Jav. *lahut*), sea; *dhina* (Mal. *hāri*), day; *bengi* (Mal. *mālam*), night; *vūlan* (Mal. *būlan*), moon; *terang* (Mal. *trang*), light; *mati,* to die; *lulat* (Mal. *kāsih*), to love; *dara,* virgin; *dhēva* (Mal. *tuhan*), god, lord; *mangan* (Mal. *mākan, santap*), to eat; *bāpa,* pak (Mal. *pā,* politely *ayah*), father; *ma, bok* (Mal. *mā, amā,* politely *ibu, bonda*), mother, etc. Compounds and derivatives abound, but the latter are more frequently formed by suffixes than by prefixes, in which the Tagala is very rich. There are many contractions into *tr, ngl, ngr,* with the dropping of short vowels, together with the alteration of the initial sound (similarly to the Celtic), and other variations which obscure the etymic origin, thus: Sans. *nātha,* master, lord, becomes *tata,* order, to reign; Jav. *neda,* to eat, *teda,* food; *nulis,* to write, *tulis,* scripture; *nitik,* to prove, *titik,* proof. The prefix *n* denotes verbs, *t* substantives; other changes are: *nyatur,* to tell, *chatur,* tale; *nyerrat,* to write, *serrat,* writing, etc. The doubling of the first syllable makes verbs, as *tutulung,* to help, from *tulung,* aid; *gagriya,* to dwell, from *griya,* house. The insertion of *in* is the sign of the passive voice. Substantives are also made by prefixing *pem* (*pen, pe*), denoting an agent; thus: *pem-pekto,* carrier, from *pekto,* to carry; *pen-dahar,* eater, etc.; by prefixing *ka,* a sign of the past participle; *ka-bekto,* Lat. *allatum;* by suffixing *n* (*en, an*): *bakt-en,* the carrying, *dahar-an,* Lat. *cibus;* and by both prefix and suffix: *ka-dahar-an,* an eatable. Articles, gender and the

dual number are wanting. In the plural, cases are denoted by particles, and also by reduplication, as in the Japanese. The genitive relation is shown by the precedence of the noun or by inserting *ing*. The other relations of case are indicated by means of verbs. The adjective is unchanged after the substantive. Pronominal forms are fewer than in Malay: *kita*, we in Malay, means I in Javanese. The numerals are: (1) *sidshi*, (2) *loro*, (3) *telu*, (4) *papat*, (5) *limo*, (6) *nem*, (7) *pitu*, (8) *volu*, (9) *songngo*, (10) *sepulah*, (11) *savelas*, (12) *volas*, etc. Ordinals are formed by prefixing *ping* or *kaping*. The figures of numbers are modified letters. The person, number, tense, mood and voice of verbs are indicated by certain particles. Many verbs and nouns are expressed by the same word, others are distinguished as stated above. The suffixes of the imperative are *o, ono, en, enno*. The following are examples of a verb in various forms: *ningngalli*, to see; passive, *dhipun, tingngalli, katingallan*, etc.; *kula, tingngalli*, I have seen; *badē kula tingngalli*, I shall see; *tinningngallam*, to see one another; *sampeyan tingngalli*, see; *kula tingngallana*, that I may see, etc. The construction is as follows:

Rama kahula kang vonten ing surga, vasta andika dadi
Father our who art in heaven, name thy be
dapienno.
hallowed.

As regards the shape and employment of letters, the graphic system is derived from the Devanagari, but not as regards their order, which is as follows: *'ha, na, tcha, ra, ka, da, ta, sa, va, la, pa, da, dja, ya, nya, ma, ga, ba, ta, ng'a*. These 20 *Akshara* (letters) are consonants with an adherent *a* in the general language, or *o* at the courts of princes, which, when not suppressed, gives to the syllabarium the epithet of *lagana*. As many *Pasangan* (consonants) are vowelless, three of them are annexed, the others subscribed to other letters. This peculiar succession of letters must have originated prior to that of the organic scheme of the Devanagari, and it is explained by its signifying: "There were two messengers, disputing, equally courageous, till both died." The *Akshara-Buddha*, being ancient, differ in form from the later *Aksharagede*. Some Kavi letters are almost like those of the Sanskrit, while the more recent resemble the square Pali. The vowels are called *Sandang'an* (connection), namely, *a, i, u, ē, ĕ* (almost French *muet*), *o*, either used as initials or (except *a*) attached to the consonants instead of the inherent *a*. The diacritic signs are analogous to those of the Devanagari. There are also characters for the quasi-vowels *le* and *re*. The writing runs from left to right, each letter being connected with the others in words, and these following one another without any space left between them. Tradition assigns the introduction of writing as well as of Brahminism and political institutions to Aji Saya Baya. Palæography finds a rich harvest in Java, its subjects being distributed in four classes: (1) inscriptions in ancient Devanagari near the ruins of Brambanan and Sinagasari; (2) those in square Kavi letters, from which the cursive are derived, mostly on stone and metal; (3) those in a dialect resembling the language of Sunda; (4) the *Chandra-Sangkala* (light of royal times or dates), which consist in selecting such words, symbolic of numbers, as may also express a fact that is to be recorded. Thus, for instance, the date of the destruction of Majapahit, a fact most important in Javanese history, is thus inscribed (1400, reading from right to left):

Sirna (o) *ilang* (o) *kertāning* (4) *bumi* (1).
Lost and gone (is) (the) work, (pride of the) earth (land).

The date of certain long graves at Gresik, near the tomb of the princess of Chermai (1313), is thus written:

Kāya (3) *vulan* (1) *pūtri* (3) *iku* (1).
Like (to the) moon princess (that) was.

The literature, which is in Kavi, dates from about the commencement of our era, and is rich, especially in legends concerning cosmogony. The subjects of the works are mostly either of a mythical or ethical character. Prominent among the former are the *Kānda* (Sans. *Khandata*, fragment, section) *Pepakem* (book), or *Sejarah* (history); *Manek-Maya*, a mythical genesis, in which Buddhism predominates; *Vivaha-Kavi* (matrimonial poem), about a *Rasaksa* (evil spirit) who courts a *Vidaduri* (nymph); *Rama-Kavi*, the Javanese *Ramayana; Parikespit*, "Arjuna's Grandson;" *Mintaraga*, a poem on Arjuna in the Indra mountain. This kind of composition comes down to the time of Aji Saya Baya. Of the ethical order are the *Niti Sastra Kavi*, in the purest style, of about the 13th century; and *Srūti*, which already alludes to Islam. But the *Brata Yudha* ("Holy War") is an epos mostly on the deeds of Arjuna; being an episode of the Mahabharata, in 712 stanzas, with varying rhymes. The *Sastra Menava* is a Javanese imitation of the ordinances of the Indian Menu. Indeed, most of the Kavi works are such imitations. Whether mere versions of Sanskrit works have been made or still exist is not precisely known; but there are many Javanese versions from the Kavi. Javanese literature abounds in romantic compositions, mostly of elegiac form. Among these, the adventures of the popular hero Pandji are most prominent. Dramas, and especially puppet shows, called *vayang* (shadows), and with figures of either leather or wood personating heroes, are popular.

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JAVA, The. See CONSTITUTION, THE.

JAVA FOWLS. See POULTRY.

JAVA SEA, a body of water with Borneo on the north, Celebes on the east, the island of Java on the south and Sumatra on the west. It borders on a number of other islands, all small. The direct route from Singapore to Australia is through Java Sea; and it is crossed by two approved routes to China, one by Pitt's Passage and the other through the Straits of Macassar.

JAVA SPARROW, a species of Oriental weaver-bird (*Munia oryzivora*), called rice-bird or paddy-bird by the British in India and China, where it has become naturalized from its original home in Java. It has a poor song but is kept in cages for its beauty and liveliness, and is sold by bird-dealers all over the world. Its colors are slate-blue and black, with conspicuous white cheeks and a swollen rosy bill. It is about seven inches from beak to tip of tail. The female is lighter in color. Fanciers have produced a pure white cage variety.

JAVARY, zhä-vä-rē', a river which has its rise on the Peru-Brazilian border, opposite Aguas Termales, Peru, in about lat. 6° S., flows northwest, then north and northeast into the Amazon River. The greater part of its course of 350 miles it forms the boundary line between Brazil and Peru. It is navigable from the mouth to the Anahuacas Mountains.

JAVELIN, a short and light spear thrown from the hand and in ancient warfare used by both horse and foot soldiers. The *pilum* of the Romans was a weapon of this description and was used either to throw or to thrust with. The shaft was four and one-half feet long and the barbed iron head was of equal length, but as it extended half way up the shaft, the whole length of the weapon was nearly seven feet. The small spears of many savage tribes have been known by this name. The throwing of javelins was one of the contests in the Olympic games (q.v.).

JAVELINE, the local name in the Rio Grande region of the small northern peccary (q.v.).

JAVELLE (zhą-vĕl) **WATER,** a solution containing potassium hypochlorite, obtained by mixing potassium carbonate, bleaching-powder and water. The liquid is employed as a disinfectant, as a bleaching agent and in photography. See BLEACHING; EAU DE JAVELLE, under EAU; and HYPOCHLOROUS ACID.

JAWS, Anatomy of the. The upper jaw is formed by the union of the two superior maxillæ; these bones each form part of the cheek, the outer wall of the nasal cavity, the hard palate and the lower part of the eye-socket. The lower jaw is formed of one bone, the inferior maxilla, which presents a horseshoe-shaped body, and vertical plates of bone ascending from the body posteriorly. The top of these vertical plates is widened into a knob-like end for articulation with the skull.

Dislocation of the jaw may take place during excessive laughter or yawning. The articular knob slips forward and the jaw is held open. Reposition is accomplished by placing the thumbs on the back teeth and making forcible downward and slightly backward pressure until the bone is felt to snap into place.

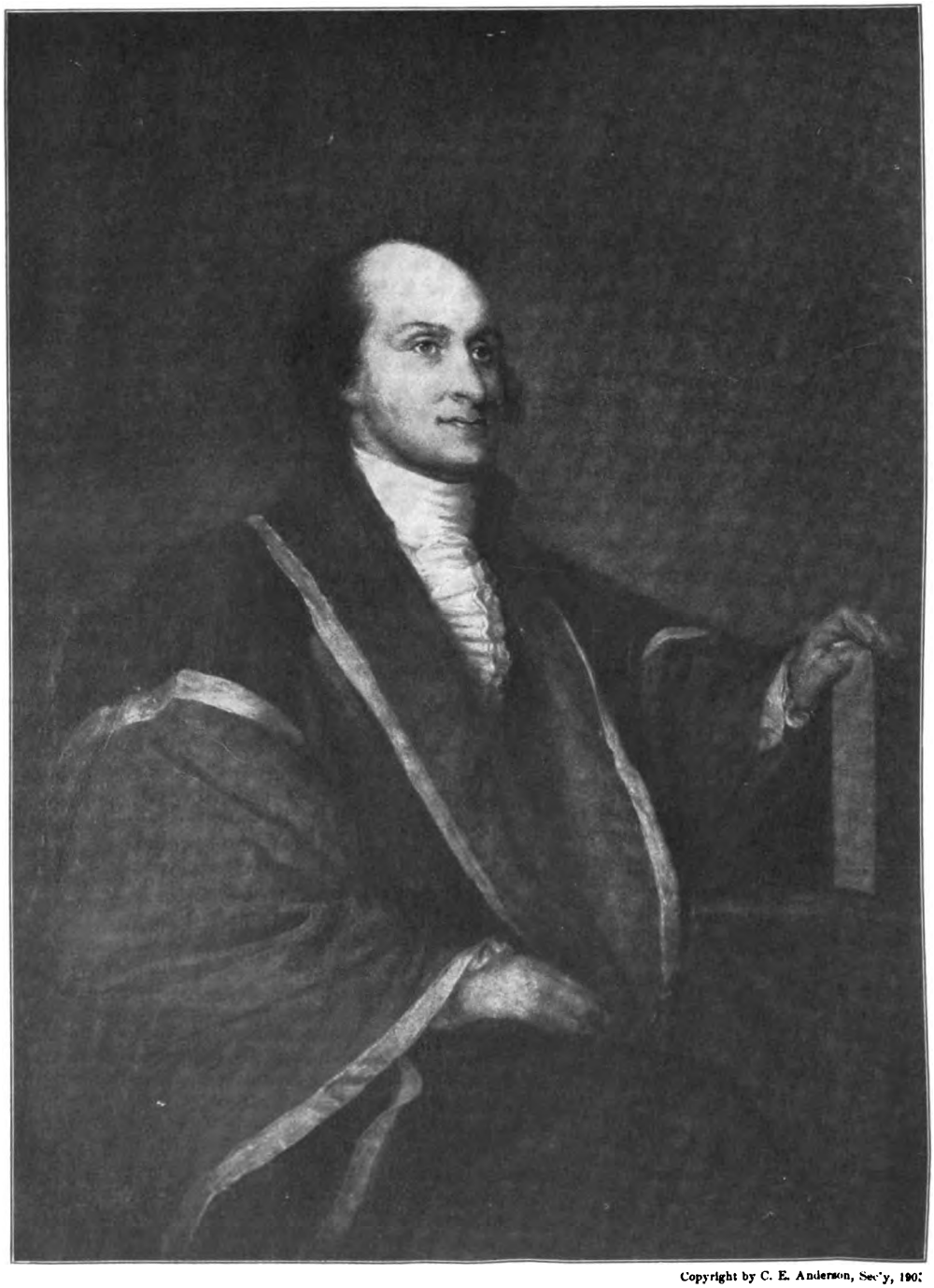
Fracture of the upper jaw is uncommon except when the face is crushed in. Usually in fracture it is the body of the lower jaw near the front that is broken. Besides the usual signs of fracture (q.v.) the attitude may be characteristic; the patient is unable to shut the jaw; and the difference in the line of the teeth may show clearly. Repair of the fracture is facilitated by fastening the upper jaw with a sling-bandage carried around the head and keeping it so fastened until union is established. During this time the patient is forced to eat liquid foods almost entirely.

JAXARTES, jăk-sär'tēz. See SYR DARYA.

JAY, SIR James, American physician, brother of John Jay (q.v.): b. New York, 27 Oct. 1732; d. Springfield, N. J., 20 Oct. 1815. He studied medicine and established himself as a physician. He was associated with Rev. Dr. William Smith in 1755 in securing an endowment for the present University of Pennsylvania; and in 1762, while on a visit to England, he represented to George III the need for higher education in the colonies, and was successful in securing funds for the endowment of King's College, now Columbia University. He was knighted in 1763. He was prominent in the passage of the New York act of attainder, and was imprisoned during the British occupation of New York, but was released in 1782 upon the arrival of Sir Guy Carleton. Author of two pamphlets concerning the collections of funds for colleges (1771, 1774); and 'Reflections and Observations on the Gout' (London 1772).

JAY, John, American statesman and jurist: b. New York, 12 Dec. 1745; d. Bedford, Westchester County, N. Y., 17 May 1829. His father was a wealthy merchant of Huguenot stock, and his mother a daughter of Jacobus Van Cortlandt. His father,—early discovering, to use his own words, that Jay was of "a very grave disposition, and took to learning exceedingly well"—sent him to a school in New Rochelle similar to Dotheboys Hall in 'Nicholas Nickleby.' Three years at school were followed by study under a tutor until he entered King's College at 14. He was graduated in 1764, the subject of his oration being the blessings of peace, of which he was to have still keener appreciation. Two weeks later, on payment of £200, he entered the office of Benjamin Kissam, a prominent lawyer of New York, as an apprentice bound to serve five years, the last two years to be devoted to the study of the law. Admitted to the bar in 1768, he soon attained prominence in the profession, forming a partnership with Robert R. Livingston, afterward chancellor of the state, and secretary of foreign affairs. In 1773 he began his public career, as secretary to the Royal Commission to determine the boundary between New York and Canada; and for the following 28 years his public services were constant, varied and of supreme importance to the country so fortunate in being his birthplace.

Bound by no ancestral ties to England, and having married in 1774 a daughter of the famous Whig and Revolutionary governor of New Jersey, William Livingston, many would suppose that in the conflict impending between the colonies and mother country, Jay's voice,



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JOHN JAY

Chief Justice of the United States Supreme Court, 1789-1795

like those of James Otis and Samuel Adams, would have been from the first "still for war." But he was constitutionally so calm and conservative that he was unwilling to be too precipitate in determining upon a change in the mode of government. When, however, the colonists decided that their only safety lay in separation, Jay was found to be as staunch and aggressive a patriot as any, and represented the citizens of New York on the committee to settle the question arising out of the Boston Port Bill. Jay drafted the suggestion of that committee that "a Congress of Deputies from the Colonies in general" be convoked — in fact, the convocation of the Continental Congress. He was a member of that Congress, and met with it in Philadelphia on 5 Sept. 1774. Congress at once appointed a committee to "state the rights of the colonies in general," of which Jay was made a member. This committee designated him to draft an address to the people of Great Britain, which was so satisfactory that it was at once reported to Congress, and adopted by it. Jefferson, without knowing who was the author, pronounced it "a production certainly of the finest pen in America."

Jay was also sent to the 2d Continental Congress, but in the interim devoted himself to shaping the public mind in the direction of obedience to Congress and in hostility to enforcement of Parliamentary taxation. When the 2d Congress convened, the signal shot — "heard round the world" — had been fired at Lexington, and Congress, realizing that a condition of war existed, deputed Jay to draft an address to the people of Canada, which was prepared and adopted, and circulated in that country. He also wrote an address to the people of Jamaica and Ireland by request of Congress, but the second petition to the king that he prevailed upon Congress to make was written by Dickinson. Other important and effective work by him in that general direction might be cited, but I shall be content with the assertion I deem supported by the facts, that as a creator and molder of public opinion at that particular juncture Jay stands unrivaled; and all this was in the main accomplished through the wise use of his pen, the efficacy of which was strongly presented by John Adams when he wrote regarding it to Jefferson, "I never bestowed much attention to any of those addresses, which were all but repetitions of the same things; the same facts and arguments; dress and ornaments rather than body, soul or substance. I was in great error, no doubt, and am ashamed to confess it, for these things were necessary to give popularity to the cause, both at home and abroad." Jay's contribution to the debates in Congress, like all his public work, showed that he followed in all things and upon all questions the path illuminated by the light of his well-balanced judgment, and his conscience, thinking not of personal popularity, but simply of the right. He served actively upon the committee that carried on negotiations with foreign powers friendly to America and inimical to England. Indeed, during the year 1775 he was a member of so many committees, each having different and important objects, that it is difficult to understand how he was able to accomplish so much important and laborious work.

If it be asked why so good a patriot as Jay was not a signer of the Declaration of Independence, the answer is, that in 1776, while a member of the Continental Congress, Jay was also elected to the New York Provincial Congress, and the Continental Congress having directed the colonies to each adopt a government, Jay, on the call of his colony, proceeded to New York to take part in the formation of the local government, where he was forced to remain while the Declaration of Independence was being signed. During 1777, and while the war was going on in the vicinity of New York, the Provincial Congress, then styled the Convention of the Representatives of the State of New York, was laboring with exceeding difficulty, the members, as is recorded, performing "all the various and arduous duties of legislators, soldiers, negotiators, committees of safety and ways and means, judges, juries, fathers and guardians of their own families, flying before the enemy, and then protectors of a beloved commonwealth." Yet amid all this turmoil and unrest a constitution was drafted by Jay which was, in the main, adopted as drafted, and was published upon 22 April 1777, by being read in front of the courthouse in Kingston. A committee was at once appointed, Jay being a member, to organize a new government; and a council of safety was created to act until the legislature should meet. Robert R. Livingston was appointed chancellor and Jay chief justice, and the judicial department of government was temporarily organized.

Jay was urged to be a candidate for governor at the first election under the constitution, but declined. General Clinton was elected over his opponent, General Schuyler, and took the oath of office, it is said, while "clothed in the uniform of the service, standing on the top of a barrel in front of the Court-House in Kingston." On 9 September following, Chief Justice Jay delivered an address to the grand jury at Kingston, which is to be found in the first volume of his correspondence and public papers. The address is a much prized document of Revolutionary times, and was, undoubtedly, intended to reach and affect a much larger constituency than the grand jury to whom it was delivered. Of course, in those unsettled days, with the struggle between the old and the new countries raging, but little litigation of importance came before the Supreme Court, so that during Jay's chief justiceship the work of the court was mainly confined to criminal trials, and the court never sat in banc. During 1778 he was active in the Council of Revision, of which he was a member ex-officio. The legislature in 1779 appointed Jay to Congress without requiring him to vacate the office of chief justice, it being resolved that owing to serious questions between certain States "a special case" obtained under the constitution. Shortly afterward Congress elected him its president. Later in the year, however, he resigned the office of chief justice, designing, he said, to recoup his failing fortunes. But his desires in that direction were not to be gratified. More than 20 years elapsed before the public he had served so well would submit to be deprived of his services.

In October, 1779, Jay resigned the presidency of Congress to accept the office of Minister to Spain. His instructions in part were to secure if possible a commercial treaty with Spain similar to that existing with France, to acquire a

port in Spanish dominion on the Mississippi, and to negotiate a loan of $5,000,000. That his mission was not entirely successful, and was personally disagreeable, was due to the fact that Spain disliked the new nation because it occupied lands formerly held by Spain, and it was apprehended that with increasing strength it might reach out and take more — fears that we know now were not groundless. While Minister to Spain, Jay was appointed, with Franklin, Jefferson, Adams and Laurens, commissioner for a general peace. Their instructions rested on the mistaken theory that France would aid in procuring for us the best possible terms. In June 1782, Jay joined Franklin, then Minister to France, in Paris, and promptly but cautiously entered upon an investigation which disclosed that France had other interests to serve than those of the United States. Possessed of the situation, he boldly entered upon negotiations with England's representative without even consulting his only colleague in Paris, whom he regarded as necessarily embarrassed by his position as Minister to France, and his instructions. With firmness, and yet with great tact, he conducted the negotiations alone until joined by Adams, who enthusiastically approved of his action, and so advised Mr. Franklin, who, after consultation, agreed that the negotiations should be concluded without consulting the French court. The result of these most interesting negotiations with England was a treaty by which the United States gained more than Congress had ever ventured to propose. And Jay's part in this great triumph of diplomacy is well summed up in a letter written by his fellow commissioner John Adams to Jonathan Jackson, "a man and his office were never better united than Mr. Jay and the commission for peace. Had he been detained at Madrid, as I was in Holland, and all left to Franklin, as was wished, all would have been lost." He was appointed by Congress Secretary of Foreign Affairs. This office he filled with his usual ability, settling international questions, and advocating the building of a navy, and the organization of a Federal government under a constitution. His papers in the *Federalist* evidence both his activity and forcefulness in this direction; and his influence contributed in no small degree in bringing New York to the support of the Federal Constitution.

It is said that after the first election of Washington to the presidency he offered Jay the choice of any office in the government, and that he chose that of chief justice of the Supreme Court of the United States, which he justly regarded as the most exalted position next to the presidency; but be that as it may, Washington appointed him to that position, and in his letter to Jay, advising him of the nomination, said, "I not only acted in conformity with my best judgment, but I trust I did a grateful thing to the good citizens of these United States." His term of office was effective in shaping the foreign policy of the United States as well as in establishing the dignity and independence of the Federal judiciary. He resigned in 1795; but in the meantime and in 1792 the Federalists supported him unsuccessfully against Governor Clinton for the governorship of New York. In 1794 President Washington urged him to go to Great Britain as special envoy to settle differences growing out of the failure of that country to keep the obligations of the Treaty of 1784,— differences which had aroused a strong war spirit all over the land. It was easy for Jay to foresee that the outcome of the situation would in all probability be unpopular with the people, but he did not hesitate to meet the responsibility that Washington believed he could meet better than any other man, partly because of the reputation he had established in England while negotiating the Treaty of Peace of 1784. A treaty resulted, known on this side of the ocean as "Jay's Treaty," which settled the eastern boundary of Maine; recovered for illegal captures by British cruisers $10,000,000; secured the surrender of the Western forts still garrisoned by the British, and came to a point of agreement about the West India trade. With the exception of the latter article the treaty was approved by the President and ratified by the Senate. But many were not satisfied, and they denounced him with tongue and pen, and even burned him in effigy in Boston, Philadelphia and at his own home, New York.

He found on his return that he had been elected governor of New York — before the public had knowledge of the terms of the treaty, of course. Before the close of that term, and in April 1799 he was re-elected by a majority so large as to constitute a personal triumph. During this term the statute was passed providing for the gradual emancipation of slaves within the State, then numbering about 22,000. The six years of his incumbency of the office of governor were crowded with interesting legislative and executive events in which he performed his part with that staunch devotion to the public interests which ever characterized his efforts throughout his career as a servant of the public, as is well illustrated by his refusal to be a party to the scheme of certain leaders of the Federalists to secure the electoral vote of New York for the ensuing election. The unexpected result of the spring elections of 1800 assured the Republicans of a substantial working majority on joint ballot, and hence of the Presidential electors under the law as it then stood. It was generally conceded that New York would determine the choice of the next President. Although the Federalists had, in March prior to the elections, defeated the attempt of the Republicans to redistrict the State, and had insisted that it was necessary that the State should act as a unit in the choice of Presidential electors, the leaders changed their position after the election had gone against them and insisted that the electors should be chosen by districts. Alexander Hamilton wrote Governor Jay on 7 May advising that he call an extra session of the legislature to enact such a statute before July first, the end of the legislative year. Philip Schuyler also wrote a letter strongly urging that such a course furnished the only means of saving the "nation from more disasters." But Jay, although a staunch Federalist, who had received the votes of New Jersey and Delaware, five votes from Connecticut and one from Rhode Island for the Presidency in the preceding electoral college, refused to take such action, and endorsed on Hamilton's letter these words: "Proposing a measure for party purposes which I think it would not become me to adopt." He refused a renomination for the office of governor on the ground that he now

intended to retire from public life, and his purpose was unshaken by President Adams announcing to him his nomination and confirmation a second time as chief justice of the United States. This office he held until 1801 when he retired from public life.

Consult 'Correspondence and Public Papers of John Jay' edited by H. C. Johnston (1890–93); Jay, William, 'Life of John Jay' (1833); Whitelocke, 'Life and Times of John Jay' (1887); Pellew, 'John Jay' (1890).

ALTON B. PARKER,
Late Chief Judge of the Court of Appeals of the State of New York.

JAY, John, American diplomatist: b. New York, 23 June 1817; d. there, 5 May 1894. He was the son of William Jay (q.v.). He was graduated from Columbia in 1836, studied law in New York, was admitted to the bar in 1839, became a prominent opponent of slavery, was secretary of the Irish relief committee in 1847 and was counsel for several fugitive slaves. He organized the meetings at the Broadway Tabernacle, New York, in 1854, and took a leading part in the organization of the Republican party at Syracuse, 27 Sept. 1855. From 1869 until his resignation in 1875 he was United States Minister to Austria, in 1877 was appointed chairman of the so-called Jay commission for the investigation of the New York customs-house administration, and in 1883 was appointed the Republican member of the New York State Civil Service Commission. He was long corresponding secretary of the New York Historical Society. In 1889 he became president of the American Historical Association, and published several pamphlets, among them 'The Dignity of the Abolition Cause' (1839), and 'The American Church and the American Slave-trade' (1860).

JAY, William, English Congregational clergyman and writer: b. Tisbury, Wiltshire, 8 May 1769; d. Bath, 27 Dec. 1853. After studying for the Congregational ministry, he officiated at Hope Chapel, near Bristol, and became pastor in 1789 of Argyle Chapel, Bath, where he remained till 1853. As a preacher he not only enjoyed a high celebrity in his own denomination, but won the applause of fastidious critics like John Foster, Sheridan and Beckford. His sermons are esteemed as well for their catholic spirit as their practical earnestness and simplicity of style, and have passed through many editions. His collected works were published in 12 volumes between 1842–48, and his autobiography in 1854.

JAY, William, American jurist: b. New York, 16 June 1789; d. Bedford, N. Y., 14 Oct. 1858. He was the son of John Jay, statesman and jurist (q.v.). Graduated from Yale in 1808, he studied law with J. B. Henry at Albany, was obliged by defective eyesight to withdraw from the profession, and became interested in various philanthropic movements, including the anti-slavery cause. He was a founder of the American Bible Society (1816), which he greatly promoted and long defended against High Church attacks led by Bishop Hobart. In 1818–21 he was judge of common pleas in New York, and in 1835–37 corresponding foreign secretary of the American Anti-Slavery Society, in the drafting of whose constitution he had assisted. He wrote much on anti-slavery, and was recognized as a leader of the more conservative of the Abolitionists. Among his publications were 'The Life and Writings of John Jay' (1833); 'An Inquiry into the Character and Tendency of the American Colonization and American Anti-Slavery Societies' (1834); 'A View of the Action of the Federal Government in Behalf of Slavery' (1837); 'War and Peace' (1848.)

JAY, Me., town in Franklin County, about 30 miles northwest of Augusta, on the Androscoggin River and on the Maine Central Railroad. There are granite quarries in the vicinity and the town possesses a large electric power plant. Pop. 2,987.

JAYADÉVA, or DJAYADÉVA, Hindu poet and dramatist: lived in 1200 or 1300 A.D. The time and details of his life are unknown, but his 'Gitagovinda,' the 'Song of Krishna,' is the only known example of the religious drama in Sanskrit. The drama is a lyric poem, and is usually given a mystical interpretation. It delineates the love of Krishna, as a cowherd, for Râdhâ, the milkmaid, his faithlessness and subsequent return to her, and is taken as symbolical of the human soul's straying from its true allegiance but returning at length to the God which created it. The work is of great poetic beauty and is remarkable for its melodious and truthful mirroring of passionate emotions. Native editions are those of Vidyasagara (Calcutta 1882); and Telang and Pansikar (Bombay 1899). 'Gitagovinda' was edited with a Latin translation by C. Lassen (Bonn 1836). English translations are those of Sir William Jones (London 1799; new ed., Calcutta 1894); and Sir Edwin Arnold, 'The Indian Song of Songs' (London 1875).

JAYHAWKER, a name originating in Kansas during the slavery and anti-slavery warfare; applied to a few Free State men who organized a system of retaliation against pro-slavery outrages. Governor Lane of Kansas, in 1861, declared that "the people of Kansas were neither thieves, plunderers, nor *jayhawkers.*"

JAYNE, Horace, American scientist: b. Philadelphia, 5 March 1859; d. 9 July 1913. He was graduated at the University of Pennsylvania in 1879, received his M.D. there in 1882, and later studied at the University of Leipzig and under Haeckel at Jena. He became professor of biology at the University of Pennsylvania in 1884, and in 1894–1905 he was professor of zoology and director of the Wistar Institute of Anatomy there. He was secretary of the biological faculty at the University of Pennsylvania in 1884–89, and dean of the collegiate faculty in 1889–94, when he resigned to accept an appointment as one of the trustees at Drexel Institute. Author of many scientific papers and 'Abnormalities Observed in the North American Coleoptera' (1880); 'Mammalian Anatomy' (1898); etc.

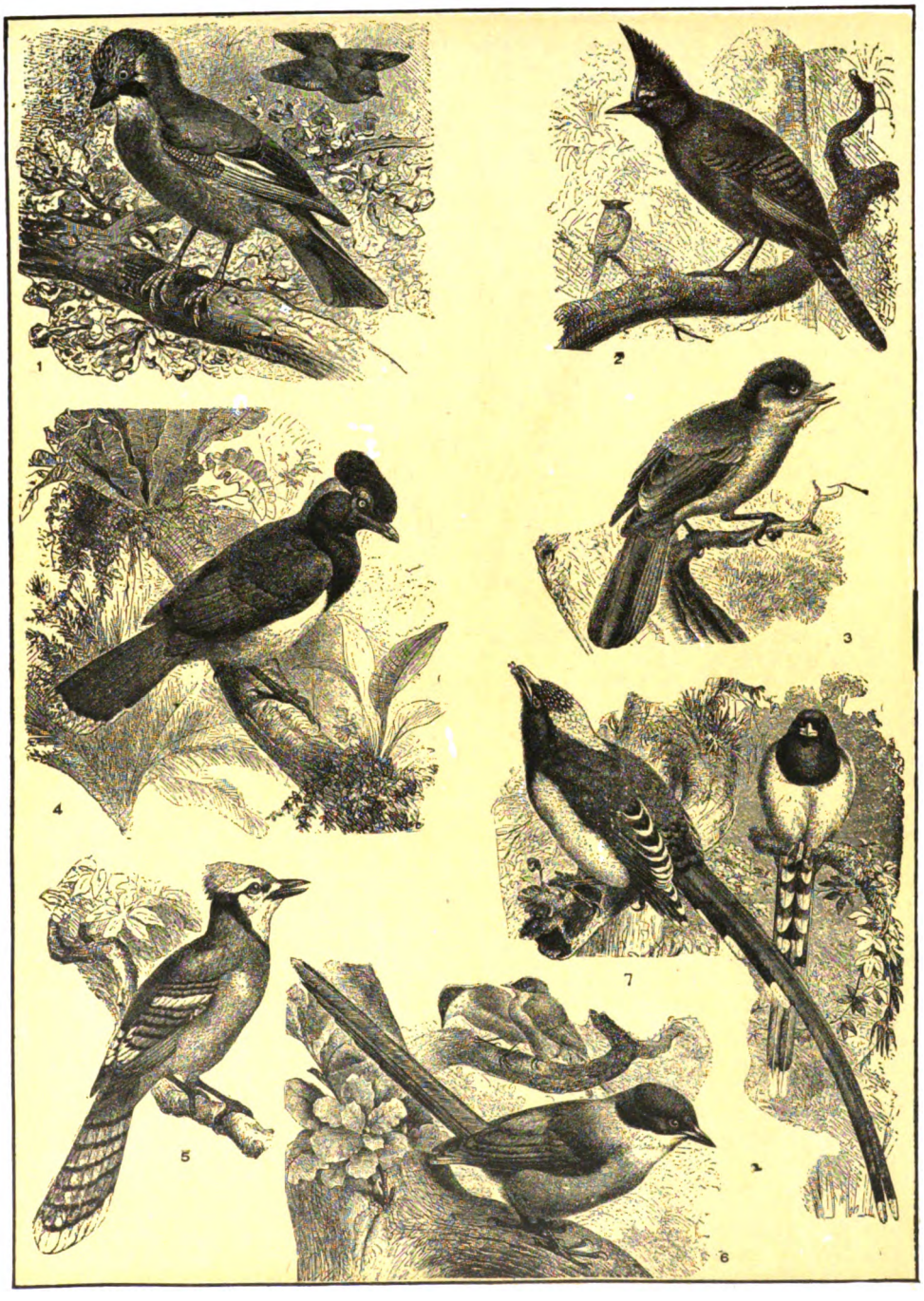
JAYS, a group of birds forming with the magpies a sub-family (*Garrulinæ*) of the *Corvidæ,* or crow family. They are readily distinguished from the true crows (*Corvinæ*) by their relatively short wings, long conspicuous tails, and usually showy plumage, in which blue colors are prominent. They are generally smaller than the crows, have weaker bills, and

feet better adapted to the more completely arboreal life which they lead. Jays are found throughout the greater part of the world, but America leads in number and variety of species. North America has four genera and 10 species with many additional local varieties. A familiar representative is the bluejay (*Cyanocitta cristata*), which is numerous throughout the eastern half of the United States and Canada. It is about one foot long, of which the tail is nearly half; the head conspicuously crested; purplish-blue above with a slight tinge of the same color on the generally gray underparts; the wings and tail are a nearly saturated blue in the males, duller in the females, cross-barred with black and with white markings especially conspicuous on the end of the tail; a rich black collar encircles the neck. The bluejay eats all kinds of nuts, fruits, large insects, and at times the eggs and young of other birds; it seldom leaves the trees in search of food, and when on the ground hops instead of walking like the crow. Except in Canada it is resident, and it breeds throughout its entire range. The nest, a large structure of twigs, grass, leaves, etc., is built in trees, bushes or old buildings. Five is the usual number of eggs. Like the magpie this jay is known to collect and hoard various glittering or brightly colored objects, but is chiefly noteworthy on account of the variety and quality of its notes which range from the harshest cries to full flute-like tones. On the Pacific Coast this species is replaced by the darker and duller Steller's jay (*C. stelleri*). The Canada jay, or whisky jack (*Perisoreus canadensis*) is, as its name indicates, a northern bird, found within the United States only along the northern border, and occasionally breeding in northern Maine. This is a dull-colored gray bird, without a crest, and with soft, lax plumage. It is well known to hunters and lumbermen whose camps it haunts with great boldness; and in manners and voice resembles the bluejay. It nests very early in the spring. Related species are the Oregon jay (*P. obscurus*) and the Siberian jay (*P. infaustus*) of boreal Eurasia. Several species of crestless deep-blue "Florida" jays (*Aphelocoma*) inhabit Florida and the West and the Southwest. The brilliant green jay (*Xanthura luxuriosa*) is an example of the gorgeous tropical jays which just enter the United States in Texas. Consult the works of Wilson, Aubudon, Nuttall and American ornithologists generally; for western species in particular, Coues, Elliott, 'Birds of the Northwest' (Washington 1874), 'Birds of the Colorado Valley' (1878); Dresser, 'Birds of Europe' (London 1879); Dawson and Bowles, 'The Birds of Washington' (Seattle 1909); Keyser, L. S., 'Birds of the Rockies' (Chicago 1902); Newton, William, 'Dictionary of Birds' (London and New York 1893–96).

JAY'S TREATY, 1794. The Articles of Confederation provided that the States might nullify at will any provisions of whatever commercial treaty Congress might negotiate; of course therefore no nation with much commerce to be disturbed by our competition would make such treaties with us. Our chief commerce was with Great Britain; and that country would make no commercial treaty whatever with us, even for years after the Constitution had given Congress power to enforce its treaties. There were two main reasons for this: first, that Great Britain had valuable commercial monopolies (especially in the West Indies) for which she thought we could return no equivalent; second, she was angry over the *sequelæ* of the Peace of 1783. She had agreed to surrender the border forts on the Great Lakes, the Saint Lawrence and Lake Champlain, and carry off no negroes, on condition that Congress "recommend" to the States to restore confiscated Tory property, and agree to confiscate no more. Congress did so twice emphatically, but the States paid no attention to it; the British government, though it knew very well how much the recommendation meant, made this an excuse to retain the forts and refuse payment for 3,000 negroes carried off; this in turn hardened the States to refuse compliance with the treaty, and the forts being made a basis for Indian outrages winked at by the British commandants enraged the country still more. The Republicans, who sympathized with the new French Republic and hated Great Britain, held the House; the Federalists, whose sympathies were exactly opposite, the Senate by a small majority. On 16 Dec. 1793, Jefferson made a famous report on a House resolution, recommending retaliatory duties; and after an acrid debate the Republicans pushed through a non-intercourse resolution, only defeated even in the Senate by Vice-President Adams' casting vote. But Washington threw his weight into the scale of peace, and nominated Chief Justice John Jay as envoy extraordinary to negotiate a commercial treaty. With Lord Granville he drew up one on 19 Nov. 1794, which removed the chief American grievance by surrendering the forts, but refused compensation for the negroes and referred all other claims to commissioners; and as to commerce, allowed direct but not coasting trade between the United States and the British East and West Indies (the latter in vessels of not over 70 tons), but denied the United States the right to export sugar, molasses, coffee, cocoa or cotton to Europe — in other words, to become an intermediary for the British colonies to evade the British commercial monopoly; and limited even this provision to two years after peace with the powers then at war with Great Britain. There were also clauses which impliedly recognized British right of search and impressment, and power to make anything contraband. The treaty was ratified by the Senate in secret session (8 June 1795), but when published excited an uproar of public indignation; Jay was burned in effigy, and even Washington vilified incredibly. The Virginia legislature and the Federal House practically passed votes of censure; but the people gradually came to recognize that it was the best thing to be had, hard as were the terms; the commercial bodies in the States openly commended it; Hamilton wrote his "Camillus" letters in its favor; and after a bitter struggle for many weeks in the House to refuse compliance with the Senate action, the treaty won by 51 to 48.

JEAFFRESON, John Cordy, English author: b. Framlingham, Suffolk, 14 Jan. 1831; d. London, 2 Feb. 1901. He was educated at Oxford and was called to the bar in 1859, but abandoned the legal profession for literature. His first novel 'Crewe Rise' (1854) was followed by a lengthy series in the three-volume type then popular, among them 'Live it Down'

THE JAY FAMILY



1 European Jay (Garrulus glandarius)
2 Mexican Long-crested Jay (Cyanocitta diadematā)
3 Canada Jay (Perisoreus canadensis)
4 Blue-capped Jay (Cyanocorax chrysops)
5 American Bluejay (Cyanocitta cristata)
6 Spanish Jay (Cyanopica cooki)
7 Red-billed Jay (Cissa erythrorhyncha)

(1863) and 'Not Dead Yet' (1864), which were moderately successful. He was appointed inspector of documents for the Historical Manuscript Commission in 1874, and from 1858 until his death he was a contributor to the *Athenæum*. He wrote five popular works of two volumes each, of anecdotal social history 'A Book about Doctors' (1860); 'A Book about Lawyers' (1866); 'A Book about the Clergy' (1870); 'Brides and Bridals' (1872); 'A Book about the Table' (1874). His duties as inspector of documents gave him access to manuscript collections which resulted in his publication of 'The Real Lord Byron' (2 vols., 1883); 'The Real Shelley' (2 vols., 1885); 'Lady Hamilton and Lord Nelson' (2 vols., 1888); 'The Queen of Naples and Lord Nelson' (2 vols., 1889; new ed., 1897). He described himself as a "realistic" biographer but was severely criticized for his censorious manner of handling his material and his lack of historical training, although the volumes gave much new and valuable information.

JEAN CHRISTOPHE, zhăn krĭs'tŏf, by Romain Rolland. One of the most noteworthy novels to appear in France, from the death of Zola to the opening of the World War, was the 'Jean Christophe' of Romain Rolland. Its importance lies partly in the novelty of its informal manner and partly in the range and importance of its theme. With regard to manner, Rolland has put away rhetoric and eloquence, climax, dramatic effect and all the traditional methods of the novelist, to tell his story in the simple language of conversation and to follow in his meandering and now and then clogged and almost tedious narrative, the slow-moving processes of life. With regard to his theme, he had set himself the task of studying the unfolding of a musical genius, tracing him from infancy through childhood and adolescence in Germany, to full maturity in Paris, at a time of unsettled, shifting and conflicting ideals. This gradual unfolding of the temperament of Jean Christophe provides the principle of unity which links the 10 small volumes of the French edition. But the analysis of Jean Christophe's psychology is but one element of interest; for the larger aspects of the theme imposed themselves upon the author as he proceeded and as he brings his hero into contact with the ruling classes in Germany, with new-found French friends and with the world of music and letters. His minute study of a single great man thus widens, until it becomes a dispassionate yet keen survey of the national ideals of leading European peoples in the sombre twilight that marked the closing of the 19th century. Teacher and critic rather than great creative artist, Rolland had been moved to write the history of the inner life of the generation that came to maturity before the Great War and to present its account to posterity.

The task was a large one and the results were uneven. The earlier volumes, especially the first, dealing with the childhood of Jean Christophe in the old-fashioned south German town, have the clearness, quaintness and charm of old engravings and are artistically the most perfect. As he proceeds and his subject broadens, the author loses himself in disquisitions on art and politics, but especially on music, which even when correct in substance are out of focus. The later volumes therefore give an impression of diffuseness and lack of artistic mastery and are marked by the touch of resentment of one who had struggled long and bitterly for recognition. No author of the time, however, had shown greater penetration, and the contrast between Teuton and Latin character and civilizations was clearly and truthfully drawn. Rolland knew the hidden springs from which France grew her strength and was conscious of the coming "revival" of the spirit of France. He foresaw also the rapidly approaching era of force and war, and his later volumes read like a prophecy of the coming cataclysm which he deplored. This is a testimony to the truth of his diagnosis. When, however, after the outbreak of the war he pleaded in *Above the Conflict*, as he had done in his novel, for mutual understanding, he was disowned by the generation which had earlier acclaimed him as its spokesman.

When all is said, in spite of the touches of sourness, of inconsistencies, tiresome disquisitions and occasionally grotesque psychology, Rolland's scope and range, his earnestness, sincerity and vision mark his work as one of the truly important achievements in French prose fiction of the last 25 years.

CHRISTIAN GAUSS.

JEAN PAUL. See RICHTER, JEAN PAUL FRIEDRICH.

JEANES, jēnz, **Anna T.,** American Quaker philanthropist: b. Philadelphia, 1822; d. there, 25 Sept. 1907. She was deeply interested in charitable and educational institutions and gave freely to their support, as well as to projects for the elevation of the negro race in the United States. She gave $200,000 to the technical school known as Spring Garden Institute; $100,000 to the Hicksite Friends; $200,000 to the Quaker schools of Philadelphia, and $200,000 to the Home for Aged Friends, to which she retired in her last years. She also gave $1,000,000 as a "Fund for Rudimentary Schools for Southern Negroes," known as the "Anna T. Jeanes Foundation" (q.v.). Miss Jeanes' bequest of $45,000 to Swarthmore College was refused by the trustees because of its proviso that the college abandon participation in intercollegiate sports, a condition they felt they had no authority to accept.

JEANES (Anna T.) FOUNDATION, a fund of $1,000,000 placed under the trusteeship of Booker T. Washington and Hollis B. Frissell, April 1907, by Miss Anna T. Jeanes (q.v.), for the purpose of "assisting in the southern United States community, country and rural schools for the great class of negroes to whom the small rural and community schools are alone available." The work of the foundation is closely allied with that of the General Education Board. It concerns itself chiefly with industrial education, extension work and the appointment of county agents with the general purpose of improving both educational and home conditions and securing public co-operation in the work. The fund is employed in stimulating effort rather than in actual payment of the cost of such extensions.

JEANNE D'ARC, zhăn dărk. See JOAN OF ARC.

JEANNETTE, Pa., borough in Westmoreland County, on the Pennsylvania Railroad, about 25 miles southeast of Pittsburgh. The natural gas which supplies the borough has contributed somewhat to its development. It is situated in a fertile agricultural region, which is also a coal mining section. It manufactures window glass, flint glass, tableware, lamps and shades, mine fans, rubber goods, bottles, etc. Jeannette was settled in 1888 and incorporated the following year. The government is vested in a burgess and a council. Pop. 9,020.

JEANNETTE EXPEDITION, an enterprise, projected 1879 by James Gordon Bennett of the New York *Herald,* who sent out an Arctic expedition from San Francisco in the steamer *Jeannette,* under command of Lieutenant De Long, U. S. N. The Jeannette was early caught in the icepack, drifted for nearly two years and never escaped from its grip. After the wreck of the *Jeannette* the crew embarked in two cutters and a whaleboat. Lieutenant Danenhower and a portion of the *Jeannette's* crew reached New York in May 1882. The bodies of De Long and his men were finally discovered in the snow, with evidences that all had perished from cold and hunger. See POLAR RESEARCH.

JEANRON, zhäṅ'rŏṅ, **Philippe Auguste,** French painter: b. Boulogne-sur-Mer, 10 May 1810; d. Paris, 10 April 1877. He studied under Sigalon and Souchon and engaged in genre and historical painting. During the Revolution of 1848 he was appointed to the charge of the Louvre and director-general of the national museums by Ledru Rollin. He opened new galleries and reclassified the pictures at the Louvre, and reorganized the collections of many provincial museums. In 1863 he was appointed director of the museum at Marseilles. He was elected to the Legion of Honor in 1855 and became corresponding member of the Institute in 1863. Among his works are 'Little Patriots' (Caen Museum); 'Harbour of Ambleteuse' (Luxembourg Gallery); 'View in the Limousin' (Lille Museum); 'Camp at Equihem' (Chartres Museum); 'View of Cape Grisnez' (Boulogne Museum); 'View of Cape Grisnez; Evening' (Aix Museum). Author of 'Histoire de l'école française' (1852); 'De l'art de la peinture' (1865).

JEBB, John, Irish clergyman of the Church of England: b. Drogheda, Ireland, 27 Sept. 1775; d. East Hill, Surrey, 9 Dec. 1833. He was educated at the Londonderry Grammar School and graduated from Trinity College, Dublin. In 1799 he was ordained. After serving as curate and examining chaplain for Archbishop Broderick he became, in 1820, archdeacon of Emly. In 1822 he was made bishop of Limerick. Five years later he was stricken with paralysis, and being unable to participate in active work he removed to England and engaged in literary work. The last year of his life he spent in arranging and superintending the rebinding of many books in his library, which numbered over 9,000 volumes. He edited several volumes, and was the author of 'Sermons on Subjects Chiefly Practical' (1815 and several later editions); 'Practical Theology' (1830; 2d ed., 2 vols., 1837); 'Pastoral Instructions on the Character and Principles of the Church of England' (1831; new ed., 1844); 'Sacred Literature' (new ed., 1831); 'Thirty Years Correspondence with Alexander Knox, Esq.' (edited by R. W. Charles Forster, 1833; who also wrote 'The Life of John Jebb with Selections from his Letters; 2 vols., 1836).

JEBB, Sir Richard Claverhouse, English Greek scholar: b. Dundee, Scotland, 27 Aug. 1841; d. 9 Dec. 1905. He was educated at the Charterhouse, London, and Cambridge University, and in 1869 became public orator there. From 1875–89 he was professor of Greek in Glasgow University, and in 1889 was appointed to the same chair at Cambridge. In 1874 married the widow of a general in the United States army, and he paid several visits to the United States. His best-known works are 'The Attic Orators' (1876); 'Modern Greece' (1880); a 'Life of Richard Bentley' (1882); 'Homer: an Introduction to the Iliad and Odyssey' (1886); 'Lectures on Greek Poetry' (1893); 'Humanism in Education' (1899), and an edition of Sophocles, with notes and translation, which is his greatest work and has been described as the "most completely satisfactory commentary on a classical author that has been written in the English language." From 1891 until his death he represented Cambridge University in Parliament. He was knighted in 1900 and the Order of Merit was conferred on him in 1905.

JECKER, zhe'kăr, **Jean Baptiste,** Swiss banker: b. Porrentruy, Bern, 1810; d. Paris, 26 May 1871. He entered the banking house of Hottinguer in 1836, and afterward settled in Mexico where he founded a bank and amassed a great fortune. In 1859 Jecker's bank undertook the conversion of the Mexican domestic debt, charging an extortionate commission which was sanctioned by President Miramón. Upon the election of President Juárez the agreement was repudiated, together with the withdrawal of permission to explore Sonora and Lower California. The French intervention in Mexico having been decided upon Jecker transferred his rights as an explorer in Sonora to that government for 10,000,000 francs, and in 1861 he settled his claim against the Mexican government for the sum of 22,660,000 francs, to be paid in three instalments. Two of these were paid, but Maximilian refused to pay the third because of the embarrassment it caused the treasury, although the later testimony of Marshal Bazaine showed the agreement to have been made by Maximilian's cabinet and the French mission, supported by the French legation. Jecker returned to France, was arrested by the orders of the Commune 10 May 1871 and shot 26 May.

JEDBURGH, jed'bŭr-ŏ, Scotland, royal and police borough and county-town of Roxburghshire, 56 miles southeast of Edinburgh, on Jed Water, a tributary of the Teviot, and on the North British Railway. It is the seat of the stately ruined abbey founded as a priory for the Augustinian monks in 1118 or 1138 and erected into an abbey by David I in 1147. The castle, erected by David in 1174 and occupied by William the Lion and other Scottish kings, was leveled by the townspeople in 1409. The site was occupied by a prison in 1823, but the building fell into disuse and is now known as

the castle. There are standing houses in which Mary Queen of Scots lived in 1566, and where Prince Charles Edward resided in 1745. The town was sacked and burned many times during the Border strife. The modern town has an excellent grammar school, fine county buildings, library, public hall and two public parks. Industries include the manufacture of woolen blankets and hosiery, breweries, tanneries, iron foundries, and the town is noted for its pears and garden produce. Pop. police borough 2,752.

JEDDAH, Arabia, (Arabic, *Juddah*), the chief trading port on the Red Sea, 60 miles west of Mecca, in the new kingdom of Hedjaz. It is a walled city containing many fine buildings and wide streets. The custom house and the mosques are the chief structures. The city is very prosperous but is handicapped by a bad water supply and an exceedingly sultry climate, the latter very trying to Europeans. In early times Jeddah was about the only point of commercial contact between Asia and Africa, and its commerce frequently reached the great sum of $4,500,000 annually. In late years this commerce has declined to about $1,000,000. The city is the centre of the trade in pearls, mother-of-pearl, coral, balsam, coffee, aromatic herbs, horses, Oriental rugs and carpets, etc. Thousands of pilgrims to Mecca pass through the city annually, and catering to their needs is an important source of income to the inhabitants. There are two lines of steamers to Suez and other lines touch here. The tomb of Eve, one of the holy places of Islam, is just without the city. Jeddah was long in the hands of the Egyptians; fell to Turkey in 1840 and in 1858 was the scene of the murder of Christian missionaries. In the July following an English war vessel besieged the city for three days. During the Great War on the formation of the new kingdom of Hedjaz, the city of Jeddah was included within that realm. Pop. about 30,000.

JEDIDAH, wife of Amon, king of Judah, the daughter of Adaiah of Bozkath, and mother of Josiah, one of the most enlightened of the kings of Judah.

JEFFERIES, Richard, English author and naturalist: b. near Swindon, 6 Nov. 1848; d. Goring, 14 Aug. 1887. He was practically self-educated, but inherited from his father, a small farmer, a love for the beauties of the country and strongly developed powers of observation. His early literary efforts, including the writing and publishing of several novels, bore scanty fruits, and his first literary production of importance was 'The Wiltshire Labourer,' published in the *Times* in 1872. In 1873 he began writing for *Fraser's Magazine* on 'Farms and Farming,' and in 1877 he achieved a considerable success by his publication in the *Pall Mall Gazette* of his series 'The Gamekeeper at Home.' His work combined beauty of expression amounting at times to prose poetry, with the acute observation of a naturalist, and his succeeding productions found an appreciative circle of admirers. His health began to break in 1881, and for the last two years of his life his work was dictated to his wife. He wrote 'The Gamekeeper at Home' (1878); 'Wild Life in a Southern County' (1879); 'Bevis' (1882); 'The Story of My Heart' (1883); 'Life of the Fields,' containing the remarkable paper, 'The Pageant of Summer' (1884); 'After London' (1885); 'Amaryllis at the Fair' (1887), etc. Too proud to make known the straightened circumstances occasioned by his many illnesses, Jefferies died harassed by poverty, but the sympathy aroused at his death caused the grant of a pension to his wife. Consult Besant, Sir W., 'Eulogy of Richard Jefferies' (1888); Salt, H. S., 'Richard Jefferies, a Study' (1894); Thomas, E., 'Richard Jefferies, His Life and Work' (1909).

JEFFERS, Wellington, Canadian clergyman: b. Cork, Ireland, 1814; d. 1896. While Wellington was still a youth he removed with his parents to Kingston, Ontario. After making his preparatory theological studies and the regular theological course he was ordained in 1841 to the ministry of the Wesleyan Methodist Church. From 1841 to 1884 he held several important pastorates within the boundaries of Ontario. He served also as district chairman for several years, was secretary of the conference in 1853, was appointed codelegate in 1866 and in 1879 was president of the conference. He retired from active duty in 1884. From 1860 to 1869 Mr. Jeffers was editor of the official organ of his church — the *Christian Guardian.* As a pulpit orator he had few peers in Canada and was famous as an extempore speaker. In theological matters Jeffers belonged to the conservative, traditional group of his church among the members of which he wielded a powerful influence. Victoria University gave him the honorary degree of D.D. in 1863.